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Leasure Kline Darbaker, president of the Plant Science Seminar (1936–1937), is the son of Rev. Dr. Henry David and Agnes Jane (Kline) Darbaker. He was born in Pittsburgh, Pa., and received his early education in McKeesport, Emlenton, Grove City College, Ohio Northern University and the University of Pittsburgh. He served an apprenticeship in Pharmacy with H. R. Gilmore, Emlenton, Pa. He attended the University of Berlin, Germany, and studied blood work in the laboratories of Wright, London, and bacteriology with Klopstock, Lederman and Kawarsky, in Germany.

Dr. Darbaker is consultant in bacteriology and microscopy at the Pittsburgh Microscopical Laboratories and of the American Bureau of Inspection and Tests. He has served as assistant and as professor in Materia Medica, Botany and Pharmacognosy in the Pittsburgh College of Pharmacy and now holds the Chair of Biology and Pharmacognosy. He has served as section officer of the AMERICAN PHARMACEUTICAL ASSOCIATION.

He is a member of a number of professional and scientific organizations and is president of the Naturalist Society of Pennsylvania, and is Grand Historian of Kappa Psi Pharmaceutical Fraternity. He has served the Pittsburgh Branch A. PH. A. in various offices.

Dr. Darbaker has written many articles on subjects relating to Microbiology, Plant Biology, Public Health and Botany and is co-author of a number of books. In 1915, he was married to Susan B. King of Emlenton, Pa.—Abstracted from a sketch in the *Pennsylvania Pharmacist.*

EDITORIAL

E. G. EBERLE, EDITOR 2215 Constitution Ave., WASHINGTON, D. C.

DISPENSING OF NARCOTICS.

THE dispensing of narcotics by pharmacists is an obligation and while every safeguard should be thrown around misuse, whenever legislation is discussed, careful consideration should be given to the wording of the enactment. *Cannabis sativa* has brought the possibility of including items for which a place may have to be made in the law or a means provided for making the product harmless; for example, hemp seed and the fixed oil of hemp; hemp seed is fed to birds and oil of hemp is used in paints. To have prohibited the use of hemp seed would have made tons of the products useless but method of treatment has prevented the loss and, probably, also safeguarded those who have unintentionally violated the law.

There are other plants that lend beauty by their flowers which may be brought into laws, as, for example, the California poppy, *Eschscholtzia californica*. Bardet and Adrain reported (1888) that they have obtained a glucoside, an alkaloid and morphine in the proportion of from five to six grams in two pounds of the dried product. Richard Fischer presented several papers in 1901, published in the PROCEEDINGS, A. PH. A. for that year on the "Alkaloids of *Eschscholtzia californica*." To the pharmacist and researcher such investigations are valuable sources of information; to those who seek the information as a means of gain it is quite a different matter and may be productive of another means of addiction. All of this signifies that there should be continued observance and research. An experienced vendor may use the commercial idea essential to a sale, but unless he has the professional understanding a most important qualification is lacking. To the one it is making a sale and gaining a profit, to the other this is secondary to protecting the one who may be injured, become afflicted or morally diseased. Greater stress should be laid on the why and wherefore of restriction in legislation. Even some court decisions show the lack of understanding of the higher principle involved. There should be not only more education, a better understanding, but a higher appreciation of professional practice. The thought has developed because of the recent acts in the misuse of narcotics and efforts in making other plants available for related purposes. Knowledge is necessary but professional thoughts and values are essential. It may well be questioned whether some articles sold in drug stores should be permitted and whether medicines should be sold in other stores only because, seemingly, these vendors possess as much knowledge regarding them as druggists. The problem is a greater one than that and concerns everybody.

Repeating, there is comparatively little need for *cannabis*, but it should be made available in the hands of those who realize the accompanying responsibility; there is no need for "marihuana" when its dangers are considered; the marihuana cigarette is one of the most insiduous of all forms of "dope," largely because of the failure of the public to understand its dangers and because of those who are unmindful of the results and blinded by gain. The large increase in the use of this drug emphasizes the need of Federal legislation to wipe out the evil before the potentialities for national degeneracy become more apparent. A bill introduced by Congressman Doughton should and will be given the support of pharmacists in order to shape it into effective legislation.

Many foods and drugs hold dangers but the greatest source of danger is the individual who will imperil the health and life of his fellow man because of greed. Temptation will always endanger health and life; danger signals can be placed, but there will always be some who are indifferent to them.

THE NEW HOME OF THE MELLON INSTITUTE.

THE DEDICATION ceremonies for the new home of the Mellon Institute were held May 5th–9th, in Pittsburgh; participating in these functions were many who are internationally known in fields of research; our president, George D. Beal, is an assistant director of the Institute. Among the speakers were a number of Nobel laureates: Dr. Irving Langmuir, Dr. H. C. Urey, Dr. W. P. Murphy, Sir Frederick Banting; also Dr. W. W. G. Maclachlan.

The Mellon Institute, founded in 1913, is a guild of scientists provided with facilities for productive effort and for mutual aid, coöperation and protection in thoroughly investigating problems of importance.

Director Edward R. Weidlein in the Foreword of the illustrated booklet of the outstanding events states that "several parts of the new home of Mellon Institute have been invested with symbolic meaning, to render the art therein emblematic of the purpose of the institution, the beneficence of science, the qualities of scientific research; this symbolism is described and interpreted by Dr. William A. Hamor."

Pharmacy and the AMERICAN PHARMACEUTICAL ASSOCIATION have been honored among the medallions, and the pharmaceutical or drug industry is also emblemized in the plants represented on the carved panels. By these coöperative efforts greater progress in medicine and pharmacy will be made; as the great pharmacist Scheele said: "It is the truth alone that we desire to know, and what joy there is in discovering it."

RESEARCH GRANTS.

The *Journal of the American Medical Association* for May 1st, publishes a long list of grants for research. Many of them are of pharmaceutical interest. A few only are noted in the following:

"Rat Test for Drug Addiction," by Eugene J. Stanton, in the proceedings of the Society for Experimental Biology and Medicine, April 1936, page 340.

"A Note on the Guinea Pig Method of Assay of Liver Extract," Bernard M. Jacobson, *British Journal of Experimental Pathology*, August 1936.

"A Summary of Studies on the Effect of Ferric Chloride on Tuberculous Rabbits," by Valy Menkin, proceedings of the Society for Experimental Biology and Medicine, March 1936.

Dr. Bernard Fantus to investigate the titration of the antitoxic value of serum patients who have received tetanus antitoxin.

Dr. C. W. Edmunds to investigate the action of the drugs in the digitalis group in animals injected with diptheria antitoxin.

Robert P. Walton of Tulane University to investigate the absorption of drugs through the oral mucosa.

Dr. Marston T. Bogert to investigate the chemistry and pharmacology of the quinazoline group.

Roberta Hafkesbring of the Women's Medical College, Pennsylvania, to investigate the effects of sodium barbital and other hypnotics.

Eugene J. Stanton to investigate the addiction tolerance and abstinence to various narcotics in animals, especially rats.

Grant to Katherine Henderson, Western Reserve University, to investigate the secretion of bismuth.

Hospital pharmacists are invited to participate in the program of the subsection established for them. The chairman is Louis C. Zopf, University Hospital, Iowa City, Ia.

SCIENTIFIC SECTION

BOARD OF REVIEW OF PAPERS.—*Chairman*, F. E. Bibbins; H. M. Burlage, W. G. Crockett, E. V. Lynn, C. O. Lee, L. W. Rising, L. W. Rowe, Heber W. Youngken, F. V. Lofgren, J. C. Krantz, Jr.

THE RELATION BETWEEN THE RAT AND THE MOUSE UNITS OF ESTROGENIC ACTIVITY.*[1]

BY L. W. ROWE AND A. E. SIMOND.

The activity of estrogenic preparations must be determined physiologically and by methods which require considerable experience in making the test. The adoption of an international estrogenic reference standard by the London Conference of 1932 and the decision to assign an activity of 10,000 International Units per mg. to this reference standard was undoubtedly a forward step. However, since the comparison between this standard and all such preparations that are manufactured for sale and subsequent therapeutic use must be carried out upon animals, it is not surprising that confusion still exists due to variable experimental ratios reported between rat units and International Units and between mouse units and International Units, whether hypodermic or oral.

Very little can be found in the literature which bears directly upon the relationship between an estrogenic rat unit and a mouse unit; in fact different workers report surprising variations in ratios between the rat unit and the International Unit as noted last year by Rowe and Simond.[2] In an article by Laquer[3] which bears directly upon this subject a mouse unit of the International Standard is found to be practically equal to an International Unit (actually 0.8 I. U.) while a rat unit is about equal to twenty (20) International Units. On this basis the rat unit is 20 times as large as the mouse unit and the ratio is 20 to 1. With the benzoic acid ester of ketohydroxyestrin the ratio was found to be 3.6 to 0.8 or 4.5 to 1 which is a very significant difference.

Since we do not agree with Laquer as to the ratio of the rat unit to the International Unit for theelin—our experimental work having repeatedly shown that 2 to 3 rat units are equivalent to 10 International Units or 1 R. U. is equivalent to 3.3 to 5 I. U., it seemed advisable to compare the mouse unit with the rat unit experimentally. This was done by testing a number of different estrogenic preparations on ovariectomized rats and mice by our regular technique, *i. e.*, 3 subcutaneous aqueous injections within 8 hours and positive estrus in 75 per cent of a group of 20 animals within 56 hours as determined by careful examination of vaginal smears. The following table will show the results as obtained experimentally.

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* Scientific Section, A. PH. A., Dallas meeting, 1936.

[1] From the Research Laboratories, Parke, Davis and Company, Detroit, Michigan.

[2] Rowe and Simond, JOUR. A. PH. A., 25, 201 (March 1936).

[3] Laquer, *Klin. Wochschr.*, 14, 339 (March 1935).

TABLE I.

Product.	Label Claim.	Rat Units.	Mouse Units.	Ratio.
Theelin in oil	10,000 I. U. per cc.	3000 R. U. per cc.	15,000 M. U. per cc.	1 R. U. = 5 M. U.
Theelin in oil	10,000 I. U. per cc.	3000 R. U. per cc.	18,000 M. U. per cc.	1 R. U. = 6 M. U.
Ketohydroxyestrin benzoate	250,000 I. U. per cc.	75,000 R. U. per cc.	15,000 M. U. per cc.	5 R. U. = 1 M. U.
Dihydroxyestrin benzoate	50,000 M. U. per cc.	50,000 R. U. per cc.	50,000 M. U. per cc.	1 R. U. = 1 M. U.
Dihydroxyestrin benzoate	50,000 M. U. per cc.	15,000 R. U. per cc.	10,000 to 15,000 M. U. per cc.	1 R. U. = About 1 M. U.

It can be seen from this data that in the case of theelin (ketohydroxyestrin) the rat unit is about 5 times as large as the mouse unit, *i. e.*, 1 R. U. = 5 M. U. This probably accounts for the fact that it became popular in foreign countries to label the activity of such preparations in mouse units, for larger numbers could be assigned than if the activity were stated in rat units.

With the benzoates of both ketohydroxyestrin and dihydroxyestrin the situation is entirely changed so that in the first case 5 R. U. is equal to 1 M. U. and in the second the two units are about equal. Fortunately this situation has been met by the adoption at the 1935 London Conference of an International Benzoate Unit which is again equal to 0.1 gamma (one ten thousandth of a milligram) of a standard benzoate preparation. It is therefore plainly evident that the activity of these two types of estrogenic preparations should be stated in terms of the proper and available international unit.

But this does not take care of the trihydroxyestrin (theelol) type of estrogenic substance which is utilized for oral dosage and for which no international standard or unit has as yet been adopted. It has been shown[2] that for the rat this substance is relatively more effective by *oral* administration than is theelin. In some tests on spayed adult mice 3 hypodermic rat units of theelol were found to be much more than 1.0 oral mouse unit as 95 per cent of the group showed typical estrus. A retest with 1.0 hypodermic rat unit of theelol on the mice orally showed that it was practically equal to 1.0 oral mouse unit as 70 per cent of the group responded positively. Thus mice are about three times as sensitive to theelol orally as are rats.

These results all point to the necessity of stating the potency of estrogenic substances in International Units only, rather than in rat units or mouse units, either hypodermic or oral. They also show by the selectivity of the different types of preparations when tested on both rats and mice, that three international estrogenic standards should be adopted. Two such standards have already been made official but the need for still another of the theelol type is evident.

It is scarcely necessary to state agreement with Laquer[3] that these various relationships as determined upon experimental animals may not be true for the human since it should be definitely understood that bioassay control of any

medicinal is concerned only with the maintenance of uniformly high potency in different lots of the same type of product.

CONCLUSIONS.

1. With the original ovarian follicular hormone ketohydroxyestrin (theelin), one hypodermic rat unit of activity is equivalent to five hypodermic mouse units.

2. With the benzoates of ketohydroxyestrin (theelin) and of dihydroxyestrin, the relationship of the rat and mouse units are found to be 5 to 1 and 1 to 1, respectively, rather than 1 to 5.

3. The desirability of stating the potency of the various estrogenic principles in the proper type of International Unit is pointed out.

EXTRACTION STUDIES ON IPECAC.*,[1]

BY SAMUEL W. GOLDSTEIN.

A number of studies on drug extraction have appeared in the literature dealing with the various factors involved in the process of percolation. With regard to the extraction of ipecac, the following menstrua have been used in the studies reported: Alcoholic, hydroalcoholic and acidified hydroalcoholic. Remington (1) pointed out the value of acetic acid as a solvent and as a menstruum for the extraction of drugs, and proposed a new class of galenicals, "acetracts," prepared with acetic acid of various concentrations. In a second paper (2) he reported on the preparation of "acetract of ipecac" with 60% acetic acid as the menstruum, and also that when weaker strengths of acetic acid were used the preparation gelatinized on standing. Roberts (3) recommended that syrup of ipecac be made from a vinegar of ipecac, like syrup of squill.[2] He stated: "acetic acid is a good solvent of the emetic properties of ipecac root." Wayne (4) prepared an acetic syrup of ipecac by macerating the drug in dilute acetic acid for 7 days, expressing and filtering, and then proceeding in the manner prescribed for syrups. Procter (5) prepared a water- and syrup-miscible fluidextract of ipecac by extracting with alcohol, distilling off the alcohol, and pouring the syrupy residue remaining into water. Breddin (6) prepared a fluidextract of ipecac by the process of diacolation (a modified fractional percolation). Other investigators (7, 8, 9, 10) have studied the effects of aqueous, hydroalcoholic and acidified hydroalcoholic menstrua on the extraction of ipecac, using the processes of maceration and infusion. Gstirner (11) studied the extraction of ipecac with water and with acidified menstrua, using hydrochloric and citric acids. He presented the results of other workers in a series of tables. Steiger (12) found, by maceration, that stronger alcoholic menstrua extracted the alkaloids and total solids more readily from finely powdered ipecac than from the coarser powders, but more dilute alcohol gave better results with a coarser powder. Bull (13) found that in the extraction of cinchona and belladonna a moderately fine powder gave the best results. Husa and Huyck (14), working with belladonna, found that within

* Scientific Section, A. PH. A., Dallas meeting, 1936.

[1] From the research laboratories of the School of Pharmacy of the University of Maryland.

[2] The Syrup of Squill official in 1858 was prepared by dissolving the sugar in the Vinegar of Squill, with the aid of gentle heat, and straining the solution while hot.

the limits of No. 20 and No. 80 powders, the fineness of the powder is of minor importance.

The present paper deals with the problem mainly as it concerns the manufacturing pharmacist, who wishes to obtain the important constituents of ipecac in such a form that they may be incorporated directly in galenical preparations, rather than the complete exhaustion of the crude drug beyond the point where the cost is prohibitive.

EXPERIMENTAL.

The ipecac used in this study met all the requirements of the U. S. P. X (1.76% alkaloids) and was in the form of a No. 20 powder. The drug was packed with approximately equal pressures in similar, slightly conical, glass percolators. In each case a 500-Gm. sample of the mixed lot of drug was used, and 250 cc. of the indicated menstruum were added to moisten the powder. Bull's (13) modification of Lenton's apparatus for the recovery of desired volumes of percolate was used, and the percolation was carried out at the rate of 12 drops per minute except where otherwise noted. In all cases, a first fraction of 500 cc. of percolate was collected and fractions of 250 cc. of percolate were collected thereafter. The percolation was continuous in all cases except the third experiment in the series in which acetic acid was used as menstruum. The menstrua used were those of the U. S. P. X, U. S. P. XI and acetic acid (9%), which has been found to be the lowest concentration of acetic acid that will prevent mold growth in the percolator.

U. S. P. X Menstrua. *Experiment 1.*—The drug was moistened with part of the first menstruum (alcohol 2, water 2, diluted hydrochloric acid 1 volume) and kept in a closed vessel for 24 hours, then it was packed and macerated, with the remainder of Menstruum I and a sufficient quantity of Menstruum II (alcohol 2, water 3 volumes), for 96 hours before starting the percolation.

Experiment 2.—The drug was moistened with Menstruum I, allowed to stand for 1 hour, then packed and, after adding the remainder of Menstruum I and a sufficient quantity of Menstruum II, allowed to macerate for 72 hours.

Experiment 3.—The drug was moistened with Menstruum I, allowed to stand for 1 hour, then packed and, after adding the remainder of Menstruum I and a sufficient quantity of Menstruum II, allowed to macerate for 48 hours.

U. S. P. XI Menstruum. In both experiments conducted with this menstruum (alcohol 3, water 1 volume) the U. S. P. XI procedure was followed.

Acetic Acid (9%). *Experiment 1.*—The drug was moistened and kept in a closed vessel for 24 hours, then it was packed and, after adding a sufficient quantity of menstruum, allowed to macerate for 48 hours before starting the percolation.

Experiment 2.—The drug was moistened, kept in a closed vessel for 2 hours, then it was packed and, after adding a sufficient quantity of menstruum, allowed to macerate for 72 hours.

Experiment 3.—The procedure followed was the same as in Experiment 2, but the percolation, in Experiment 3, was stopped after each fraction of percolate was collected and the drug was allowed to macerate for 72 hours before continuing the percolation.

Each fraction of percolate was assayed for ether-soluble alkaloids by the method in the U. S. P. XI, and for total solids by drying a measured volume of percolate to constant weight in an oven at 100° C.

The percentage (w/v) of alkaloids in each fraction of percolate, and the percentage (w/w) of alkaloids extracted in the first 1000 cc. of percolate and, in those instances where the percolation was continued, in the 1500 cc. of percolate are given in Table I.

The results in Table I show that the U. S. P. X menstrua, after allowing the moistened drug to stand for 24 hours before packing and then allowing a 96-hour period of maceration, extracted a greater proportion of alkaloids than when the macerating periods were reduced to 1 hour before and 72 hours after packing, respectively, especially in the first fraction of percolate. When the macerating periods were reduced to 1 hour and 48 hours, respectively, the proportion of alkaloids in the first fraction of percolate dropped considerably. However, as the percolation continued, the total amount of alkaloids extracted approached a more nearly constant value, particularly in the latter two experiments.

TABLE I.—PERCENTAGE (W/V) OF ALKALOIDS IN FRACTIONS OF PERCOLATE.

Menstrua.	Fractions of Percolate. 1.	2.	3.	4.	5.	Alkaloids from 500 Gm. of Drug in % w/w. 1st 1000 Cc. of Percolate.	1500 Cc. of Percolate.
U. S. P. X	1.18	0.25	0.18	..	..	1.40	..
	1.01	0.27	0.17	..	..	1.23	..
	0.83	0.40	0.33	0.15	0.15	1.20	1.35
U. S. P. XI	1.11	0.30	0.14	..	..	1.33	..
	1.07	0.40	0.17	0.03	0.05	1.36	1.40
Acetic Acid (9%)	1.07	0.29	0.10	..	..	1.27	..
	1.18	0.18	0.15	0.04	0.03	1.35	1.39
	0.96	0.57	0.41	0.09	0.04	1.44	1.51

The length of the periods of maceration before and after packing were the same in both experiments carried out with U. S. P. XI menstruum, and the results are in fairly close agreement.

The figures resulting from the experiments with acetic acid (9%) indicate that maceration after packing exerts a greater influence on the extraction of the alkaloids than does the maceration before packing; for in the first two experiments the total lengths of time for maceration were about the same, but in the second experiment the time before packing was 22 hours shorter and the time after packing was correspondingly longer than in the first experiment. The percentage of alkaloids obtained in the first percolate of the second experiment was 10% greater than the percentage of alkaloids obtained in the corresponding percolate in the first experiment.

The rate at which percolation was allowed to proceed had a definite effect on the rate of extraction of the alkaloids as may be seen from the results of the first fractions of percolate which were obtained by percolating at the rate of 8 drops per minute in the first two experiments and at the rate of 16 drops per minute in the third experiment. In the third experiment, interrupting the percolation and allowing the drug to macerate for 72 hours greatly increased the yield of alkaloids in each of the succeeding fractions, as compared to the corresponding fractions obtained in the other experiments, and resulted in the extraction of a higher total amount of alkaloids than was obtained in any of the other experiments.

The percentage (w/v) of total solids extracted in each fraction of percolate, and the percentage (w/w) of total solids extracted in the first 1000 cc. of percolate and in 1500 cc. of percolate are given in Table II.

TABLE II.—PERCENTAGE (W/V) OF TOTAL SOLIDS IN FRACTIONS OF PERCOLATE.

Menstrua.	Fractions of Percolate. 1.	2.	3.	4.	5.	Total Solids from 500 Gm. of Drug in % w/w. 1st 1000 Cc. of Percolate.	1500 Cc. of Percolate.
U. S. P. X	19.74	4.21	1.77	..	..	22.73	...
	16.34	4.78	3.03	..	..	20.25	...
	12.33	6.60	5.75	3.31	2.37	18.51	21.35
U. S. P. XI	15.47	4.94	2.02	..	..	18.95	...
	14.85	6.45	2.62	1.19	0.94	19.38	20.45
Acetic Acid (9%)	19.58	5.20	2.73	..	..	23.55	...
	21.65	3.63	1.60	0.76	0.54	24.27	24.91
	16.81	10.97	5.49	1.12	0.61	25.04	25.91

The figures in Table II show that the yield of total solids in the first fraction of percolate in the experiments with U. S. P. X and U. S. P. XI menstrua varied directly with the length of time allotted to the periods of maceration before and after packing, with the maceration after packing having the more pronounced effect. Similar results were obtained in the first two experiments with acetic acid; for, although the total times of maceration were approximately equal, a shorter preliminary and correspondingly longer secondary maceration was allowed in the second experiment. In the first two experiments with acetic acid the percolation proceeded at about 8 drops per minute. The third experiment with the same menstruum, after maceration periods similar to those in the second experiment, was carried out at the rate of 16 drops per minute and gave the lowest yield of extracted matter in the first fraction of percolate. However, as the

percolation continued, the amount of total solids obtained approached a fairly constant value for each menstruum. The acetic acid extracted more of the total solids in every case than was extracted by either of the other two menstrua.

The figures for the ratio of alkaloids to other solids, *i. e.*, percentage of total solids minus percentage of alkaloids, are given in Table III, expressed as parts of alkaloids per 100 parts of other solids.

TABLE III.—RATIO OF ALKALOIDS TO 100 PARTS OF OTHER SOLIDS.

Menstrua.	Fractions of Percolate. 1.	2.	3.	4.	5.	Ratio Obtained from Total Extractives. 1st 1000 Cc.	1500 Cc.
U. S. P. X	6.36	6.31	11.32	..	..	6.56	..
	6.59	5.99	5.94	..	..	6.46	..
	7.21	6.45	6.09	4.74	6.75	6.93	6.75
U. S. P. XI	7.74	6.47	7.45	..	..	7.60	..
	7.76	6.61	6.90	2.58	5.62	7.54	7.35
Acetic Acid (9%)	5.78	5.91	3.80	..	..	5.70	..
	5.76	5.22	10.34	5.55	5.88	5.89	5.91
	6.05	5.48	8.07	8.73	7.02	6.10	6.19

The figures in Table III indicate that the different menstrua used in continuous percolation do not extract the alkaloids and other solids from ipecac at the same rate. For each menstruum the rates appear to be roughly parallel, but, since the factors affecting extraction were varied, no general conclusion can be drawn. When interrupted percolation was carried out with acetic acid (9%) as menstruum, the total amount of alkaloids extracted increased proportionally more than the total amount of other solids as indicated by the higher ratio. The ratios obtained from the total extractives of alkaloids and other solids show that the U. S. P. XI menstruum extracted the smallest amount of other solids, whereas it extracted the alkaloids fairly well; and that acetic acid (9%) extracted the largest amount of other solids regardless of the manner of percolation and the amount of alkaloids extracted at the same time.

LARGE SCALE EXTRACTIONS.

U. S. P. IX Menstrua and Acetic Acid (9%).—Fifty pounds (22.72 Kg.) of the same lot of No. 20 powdered ipecac that was used in the earlier experiments were extracted in a cylindrical earthenware percolator. The drug was moistened with Menstruum I of the U. S. P. IX and kept in a closed vessel over night, then it was packed and macerated with the remainder of the Menstruum I and a sufficient quantity of Menstruum II for 96 hours before starting the percolation, which was carried out at the rate of 9 drops per minute. The menstrua given in the U. S. P. IX were the same as those given in the U. S. P. X for Fluidextract of Ipecac, with the exception that two-thirds as much of Menstruum I (alcohol 2, water 2, diluted hydrochloric acid 1 vol.) was used in the earlier procedure. After the first fraction of percolate (50 pints) was collected, the addition of the hydroalcoholic menstruum was discontinued and acetic acid (9%) was added thereafter. The last two fractions of percolate were collected at the rate of 8 drops per minute. Total elapsed time for the extraction was 66 days.

Acetic Acid (9%).—Fifty pounds of the No. 20 powdered ipecac were moistened with acetic acid (9%) and kept in a closed vessel over night, then it was packed in a cylindrical earthenware percolator and, after adding a sufficient quantity of menstruum, macerated for 144 hours before starting the percolation, which was carried out at the rate of 13 drops per minute for the first two fractions of percolate and at the rate of 25 drops per minute for the last fraction of percolate. After each of the first two fractions of percolate were collected, the percolation was stopped and the drug was macerated for 72 hours. Total elapsed time for the extraction was 54 days.

In both experiments fractions of 50 pints (23.57 liters), 22.5 pints (10.61 liters) and 27.5 pints (12.97 liters) were collected.

The percentage (w/v) of alkaloids in each fraction of percolate, and the percentage (w/w) of alkaloids extracted from the drug are given in Table IV.

TABLE IV.—PERCENTAGE (W/V) OF ALKALOIDS IN FRACTIONS OF PERCOLATE.

Menstrua.	Fractions of Percolate. 1.	2.	3.	Alkaloids from 50 Lbs. of Drug in % w/w
U. S. P. IX and Acetic Acid (9%)	1.02	0.37	0.07	1.27
Acetic Acid (9%)	1.21	0.36	0.10	1.48

The results in Table IV show that interrupted percolation with acetic acid (9%) extracted a higher percentage of alkaloids than was extracted by the menstrua given in the U. S. P. IX for the first fraction, and acetic acid (9%) for the second and third fractions of percolate with continuous percolation. The percentage of alkaloids extracted in the second experiment was 16.5% greater than the percentage of alkaloids extracted in the first experiment. Furthermore, it should be noted that although, in the second experiment, the preliminary maceration was 2 days longer and the percolation was interrupted twice for periods of 3 days, the total elapsed time for the extraction was 54 days as compared with 66 days for the extraction in the first experiment.

The percentage (w/v) of total solids in each fraction of percolate, and the percentage (w/w) of total solids extracted from the drug are given in Table V.

TABLE V.—PERCENTAGE (W/V) OF TOTAL SOLIDS IN FRACTIONS OF PERCOLATE.

Menstrua.	Fractions of Percolate. 1.	2	3.	Total Solids from 50 Lbs. of Drug in % w/w.
U. S. P. IX and Acetic Acid (9%)	17.47	5.33	1.90	21.70
Acetic Acid (9%)	21.25	4.67	1.62	25.20

The figures in Table V show that acetic acid (9%) extracted more of the total solids than was extracted by the menstrua used in the first experiment. The percentage of total solids extracted in the second experiment was 16.1% greater than the percentage of total solids extracted in the first experiment.

The figures for the ratio of alkaloids to other solids, expressed as parts of alkaloid per 100 parts of other solids, are given in Table VI.

TABLE VI.—RATIO OF ALKALOIDS TO 100 PARTS OF OTHER SOLIDS.

Menstrua.	Fractions of Percolate. 1.	2.	3.	Ratio Obtained from Total Extractives from 50 Lbs. of Drug.
U. S. P. IX and Acetic Acid (9%)	6.20	7.46	3.82	6.22
Acetic Acid (9%)	6.03	8.35	6.58	6.23

The final figures in Table VI show that the relative increases in the percentages of alkaloids and total solids extracted in the second experiment, as compared with the percentages obtained in the first experiment, were approximately equal. This was found to be true; for the increase in the percentage of alkaloids extracted was 16.5%, while the increase in the percentage of total solids extracted was 16.1%.

DISCUSSION OF RESULTS.

The results obtained in this investigation show that the hydroalcoholic menstruum adopted in the U. S. P. XI for the extraction of ipecac in the preparation of the fluidextract has been well chosen; inasmuch as it removes the alkaloids quite readily, and, at the same time, extracts less of the other solids than do the other menstrua studied. The efficacy of shortening the time of preliminary maceration before packing and increasing the time of maceration after packing, as directed in the U. S. P. XI has been definitely demonstrated. Procter (15) and, more recently, Scoville (16) have contended that moistening the drug before packing is of value

only in cases where the powdered drug swells on addition of the menstruum used. This has been substantiated by Husa and Yates (17), working with belladonna root, and is further confirmed by the present results with ipecac.

Husa and Yates (17), working with belladonna root (menstr.: alcohol 5, water 1 vol.), found that maceration after packing was of no appreciable value in promoting rapid extraction of alkaloids. Husa and Huyck (18), working with belladonna root (Menstruum: alcohol 5, water 1 vol.), yellow cinchona (Menstruum: glycerin 1, hydrochloric acid 1, alcohol 8 volumes), and nux vomica (Menstruum I: acetic acid 100 cc., water 150 cc., alcohol 750 cc.; Menstruum II: alcohol 3, water 1 volume), found that maceration after packing caused a slight increase in efficiency of extraction. The experiments reported here, in which the ipecac was extracted with the U. S. P. X menstrua, gave the following results: When the drug was macerated for 24 hours before packing and 96 hours after packing, the percentage of alkaloids in the first percolate was 1.18%, which was 16.8% greater than the percentage of alkaloids (1.01%) in the first percolate obtained in the second experiment (macerated for 1 hour before and 72 hours after packing). In the third experiment, the first percolate, obtained after macerating for 1 hour before packing and for 48 hours after packing, contained 0.83 per cent of alkaloids, which was 17.8% less than the percentage of alkaloids in the first percolate obtained in the second experiment.

The results of the experiments carried out with acetic acid (9%) as menstruum also indicate that the length of the period of maceration after packing the drug directly influences the efficiency of extraction.

Although a higher yield of alkaloid was obtained in the first portion of percolate when the drug was macerated for a longer period before percolation, this advantage practically disappeared as the percolation continued. However, it is undoubtedly an advantage to have the desired principles of the drug extracted with as little menstruum as possible, especially in large scale operations.

Extraction of ipecac with acetic acid (9%) was more efficient when percolation was carried out at a rate of 8 drops per minute than when the rate was increased to 16 drops per minute. Interrupted percolation, in which the menstruum is allowed to become more nearly saturated, by maceration, with respect to the substances being extracted, is notably helpful in attaining the above-mentioned goal in the extraction of ipecac with acetic acid. Husa and Yates (17) found that this did not hold in the case of belladonna root extracted with the official menstruum (alcohol 5, water 1 volume).

Bull (13) found that, in the extraction of cinchona with 80% alcohol, the relative percentage of alkaloids to other solids increased in successive fractions of percolate. He found the opposite to be true in the extraction of belladonna root with 90% alcohol. In the present work, the relative percentage remained roughly the same for each menstruum, indicating that in the case of ipecac, as long as the same menstruum is used, variations in certain of the other factors influencing extraction affect the removal of the alkaloids and other solids to relatively the same extent.

The results obtained in the extraction of 50-pound batches of powdered ipecac are in agreement with the results of the experiments with 500-Gm. portions of drug and emphasize the applicability of acetic acid (9%) as a menstruum for the extraction of ipecac.

We have no doubt that general statements, as to the predicted behavior of different drugs with various menstrua, cannot be of any value in the light of our present knowledge; and, that the effects of varying the factors involved in any set of conditions pertaining to drug extraction must be determined experimentally.

CONCLUSIONS.

1. The menstruum and procedure given in the U. S. P. XI for the extraction of ipecac in the preparation of the fluidextract have been proved to be well chosen.

2. When similar methods were used, the U. S. P. XI menstruum extracted a higher percentage of alkaloids and a lower percentage of other solids than were extracted by the U. S. P. X menstrua or by acetic acid (9%).

3. Interrupted percolation with acetic acid (9%) yielded a higher percentage of alkaloids than was obtained by continuous percolation with either of the other two menstrua used. At the same time the percentage of total solids extracted by the acetic acid was increased only slightly over the amount extracted by the same menstruum by continuous percolation.

4. Although the maceration before packing the drug need be only long enough to allow swelling to occur, the length of the period of maceration after packing is important, especially if one wishes to obtain as much of the alkaloids as possible in the first fractions of percolate.

5. In manufacturing or in other instances, in which a comparatively large amount of total solids is unobjectionable, extraction with acetic acid (9%) is satisfactory, and results in considerable reduction in the cost of the extraction of ipecac.

Further investigations are being carried out on ipecac and other drugs.

The author is indebted to Mr. Sidney Hollander for suggesting the problem, and to the Maryland Pharmaceutical Co. for supplying the drug and for the use of its extraction facilities.

The author also wishes to express his appreciation to Dr. A. G. DuMez for his interest in the work.

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A STUDY OF SEVERAL SPECIES OF THE GENUS MONARDA.*,[1]

BY B. V. CHRISTENSEN[2] AND R. S. JUSTICE.[3]

2—Chemical Examinations of Alcoholic Extractive and Miscellaneous Determinations.

PART I. THE ALCOHOLIC EXTRACTIVE OF MONARDA MENTHÆFOLIA.[4]

Material used in the following investigation was collected during the months of June and July 1931, while the plants were in flower in the southeastern part of Wyoming and the adjacent portion of Colorado in the counties of Albany and Larimer, respectively. The fresh plants were identified by Professor Aven Nelson of the Botany Department of the University of Wyoming.

It may be of some importance to record the fact that these plants were collected at altitudes ranging from 5000 to 7000 feet. The soil was gravelly and was high in iron oxide content as manifested by the reddish color characteristic of the Sherman Hill Gravel obtained from that locality.

The material was air dried in a cool room immediately after collection. A representative sample of the total amount collected was separated as quantitatively as possible into flower heads, leaves, stems and roots, and the percentage of each was computed with reference to the total weights of the several parts. Inasmuch as the roots retained by the plants cannot be considered representative, the percentages are also computed with reference to the overground portion of the plant as indicated in the following table:

Table I.—Percentages of the Parts of Monarda Menthæfolia.

	Entire Plant.	Overground Plant.
Flower Heads	8.76%	9.21%
Leaves	40.76%	42.88%
Stems	45.55%	47.91%
Roots	4.93%	0.00%
Total	100.00%	100.00%

The laboratory work for the following investigation was carried out at the University of Wisconsin. Time permitted a study of the leaves and flower heads only.

Twenty-four and one-tenth Kg. of comminuted leaves and flower heads were extracted with 95 per cent alcohol in a Lloyd extractor. The removal of the excess alcohol in the resulting extract was carried out under reduced pressure. The resulting, semi-solid extract weighed 4040 Gm. or 16.77 per cent of the dried plant material.

In order to remove the volatile as well as the fatty oil, the alcoholic concentrate was repeatedly shaken with petroleum ether. From the combined petroleum-ether solutions the solvent was recovered for the most part by distillation. The residue weighed 1180 Gm.

The petroleum-ether extractive and the residue of the alcoholic extract were both steam distilled. The steam distillation and the petroleum-ether extraction naturally separated the alcohol extractive into the following fractions:

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* Scientific Section, A. Ph. A., Dallas meeting, 1936.

[1] From a dissertation presented in partial fulfilment of the requirements for the degree of Doctor of Philosophy at the University of Florida, August 1935.

[2] Director of the School of Pharmacy, University of Florida, Gainesville, Florida.

[3] Graduate Assistant in Pharmacognosy, University of Florida, 1933–1935.

[4] See Jour. A. Ph. A., 25, 850 (1936), for preliminary report.

(1) The non-volatile products soluble in petroleum ether consisting of the fatty oil. This weighed 872 Gm. corresponding to 3.62 per cent of the air-dried plant material.

(2) The volatile products soluble in petroleum ether consisting of the volatile oil. Two hundred and sixty-six cc. of the original oil were obtained and in addition 41 Gm. were obtained by cohobation. The total corresponds to 1.26 per cent of the plant material.

(3) The water-insoluble portion of the alcoholic extractive previously deprived of its petroleum-ether soluble material. This weighed 687 Gm. corresponding to 2.85 per cent of the plant material.

(4) The water-soluble portion of the alcoholic extract previously deprived of its petroleum-ether soluble material. This extract weighed 2174 Gm. corresponding to 9.02 per cent of the plant material.

The Fatty Oil.—This extract was a dark green semi-solid material. An attempt was made to determine the saponification value. Due to the intense green pigmentation it was impossible to get any values under ordinary circumstances. After trial it was found that relative values could be obtained using a spot plate and phenolphthalein as an indicator. In this manner the following values were obtained: 90.7; 93.5 and 90.7.

Three hundred Gm. of the fatty oil were saponified with alcoholic potassium hydroxide using a fifty per cent excess. The saponification was carried out in a reflux apparatus for one hour. The excess alcohol was then removed by distillation. One hundred and seven Gm. of non-saponifiable matter were obtained in this way.

The aqueous alkaline soap solution was now acidified with hydrochloric acid. The fats rose to the surface of the water. They were removed and washed with dilute sodium carbonate solution and then with water. In this manner 189 Gm. of fatty acids were obtained.

The Non-Saponifiable Matter.—The non-saponifiable matter obtained above was acetylated by boiling with acetic anhydride for one hour and then the mixture was poured into alcohol. The only product obtained was oily in character. No further study was made.

The Fatty Acids—Separation of the Solid from the Liquid Fatty Acids.—Modifying the Twitchell Method (1), 100 Gm. of the fatty acids were dissolved in 600 cc. of alcohol and the mixture heated to boiling. A boiling solution of 75 Gm. of lead acetate in 600 cc. of alcohol was added with constant stirring to the fatty acid solution. The resulting solution was cooled and allowed to stand at 0° for 12 hours. The solution was filtered at 0° and the filtrate is a solution of the lead salts (A).

The residue on the filter was boiled with 1200 cc. of alcohol and then cooled. This solution was set aside at 15° C. for 12 hours and filtered. The filtrate was reserved. The residue was treated again with boiling alcohol, set aside at 15° C. and filtered. The combined filtrates contained the lead salts (B).

The residue above was again boiled with alcohol and filtered while hot. The procedure was repeated. The filtrates containing the lead salts soluble in boiling alcohol were combined (C). The insoluble lead salts are (D).

The individual fractions above were freed of lead by treating with hydrogen sulfide in the alcoholic solutions and subsequent filtration to remove the lead sulfide. As explained above, the following fractions of the fatty acids were obtained:

A. Liquid fatty acids whose lead salts were soluble in alcohol at 0° C. Fatty acids with relatively high unsaturation, 35 Gm.

B. Liquid fatty acids whose lead salts are insoluble at 15° C. Fatty acids with relatively lower unsaturation than those above, 36 Gm.

C. Solid fatty acids whose lead salts are insoluble at 15° but are soluble at the boiling point of alcohol, 10 Gm.

D. Solid fatty acids whose lead salts are insoluble even in boiling alcohol, 20 Gm.

Bromination of the Liquid Fatty Acids.—Fractions A and B were in alcohol solution after the removal of the lead. The alcohol was removed by distillation in a stream of carbon dioxide. The acids were thrown into water, shaken out with ether and the etherial solution, 250 cc. of

solution for both A and B were dried over anhydrous sodium sulphate. In the etherial solution, the liquid fatty acids were brominated by adding chilled bromine dropwise to the chilled etherial solutions. At no time did the temperature rise over −10° C. during the addition of the bromine. The temperature range was from 10° to −15° C. A fifty per cent excess of bromine was added in each case.

Linoleic Acid Hexabromide.—The precipitate which formed in the solution of (A) fatty acids was filtered off. No precipitate formed in the (B) fatty acids solution. The crystals obtained were washed and dried. They melted at 180–182° C. Linoleic acid hexabromide melts at 180–182° C. The crystals also contained 64.67 and 62.01 per cent bromine, respectively, according to two determinations. The theoretical bromine content of linoleic acid hexabromide is 63.32 per cent.

The ether was next removed by distillation from the fractions A and B. The residues were taken up in petroleum ether. A portion in each fraction remained insoluble. The melting points of these insoluble substances which were dark brown in color and not definitely crystalline were between 175° and 200° C. However, they contained only 7 to 17 per cent of bromine. No definite substances could be separated from these dark colored precipitates.

Linoleic Acid Tetrabromide.—After the removal of the above precipitates from the petroleum ether, there remained a solution of the petroleum-ether soluble fractions. After some evaporation and chilling for several days, fraction A yielded a precipitate of white crystals which weighed 0.4 Gm. and melted at 114–115° C. Linoleic acid tetrabromide melts at 114–116° C.

Strange New Acid Bromide.—Upon standing for a time after the separation of the linoleic acid bromide a further crystallization took place; 0.6 Gm. of a fine white crystalline powder was obtained. This substance melted sharply between 95° and 95.5° C. Recrystallization did not change the melting point. In addition to this the substance contained 46.33 and 46.94 per cent bromine, respectively, according to two determinations. In fatty acid literature there does not seem to be any product of a similar nature reported. Due to the small amount of the product it could not be further characterized. In 1930 Harwood (2) in his work on *Monarda punctata* seeds reported an acid whose bromide melted at 95° C. and which contained 46 per cent of bromine. These two products are possibly the same.

Oleic Acid Dibromide.—The petroleum ether was removed from the above solutions and a heavy reddish oil was obtained. Oleic acid dibromide is a liquid. The reddish oil was found to contain 35.03, 35.32 and 32.02 per cent of bromine, respectively, in three determinations. The theoretical bromine content of liquid oleic acid dibromide is 36.18 per cent. The yield was 31 Gm.

Solid Fatty Acids.—The alcohol was removed from the lead-free solutions of fraction C. This yielded 10 Gm. of fatty acids which were light green in color. The corresponding extract from fraction D weighed 20 Gm. and both fractions of the acids were dark green in color. No further information was obtained.

Water-Soluble Portion of the Alcoholic Extract.—The water-soluble portion previously deprived of its petroleum-ether-soluble material was first extracted with carbon tetrachloride. In preliminary tests it was found that warm carbon tetrachloride removed hydrothymoquinone in a condition that readily yielded to simple means of purification. The extract was a semisolid at room temperature but was fluid at the temperature of the water-bath.

Carbon Tetrachloride Extract.—The extraction was carried out in a flask provided with a mechanical stirrer and a reflux condenser. One liter of carbon tetrachloride was added to the extract in the flask and the whole was refluxed for one hour in a boiling water-bath with stirring. While still hot the underlying layer of carbon tetrachloride was poured off. All but 50 cc. of the solution was removed by distillation. The above procedure was repeated 6 to 7 times and the resulting extracts were combined.

Upon chilling the extracts, a greenish brown solid separated and was filtered off. The filtrate yielded nothing further even after treatment with charcoal.

Hydrothymoquinone.—The greenish brown solid obtained in the filtration above was placed in boiling water. The larger portion of the solid material went into solution and the resulting solution was filtered while hot. Upon cooling, hydrothymoquinone crystallized out spontaneously in a relatively pure condition. After repeated recrystallization from water a pure substance melting at 142–143° C. was obtained. This substance gave the quinhydrone reaction

with thymoquinone. A mixed melting point with pure hydrothymoquinone was 142–143° C. and since the sample of hydrothymoquinone melted at 142–143° C. the substance was proved to be the quinone.

Pigments.—The residue insoluble in boiling water in the separation of the hydrothymoquinone was taken up in absolute alcohol. The material soluble in boiling absolute alcohol was obtained by filtering the hot solution. There was a small amount of yellow powder obtained after cooling, filtering the solution and drying. It melted at 216–218° C.

Upon cooling and partial evaporation of the alcoholic filtrate above, another yellow substance crystallized out. After repeated recrystallization from alcohol, yellow needles were obtained which melted at 204–205° C. The quantity was 0.2 Gm. This latter substance was soluble in ether, cold alcohol, water, cold carbon tetrachloride and chloroform. It gives a green coloration in alcoholic solution when treated with alcoholic ferric chloride. The reactions and properties of this compound strongly suggest the possibility that it is a pigment of the flavone group.

Ether Extract.—The aqueous extract was next extracted repeatedly with ethyl ether. Thirty-six Gm. of the ether-soluble extractive were obtained in this way.

SUMMARY AND CONCLUSIONS.

An alcoholic extract was prepared from the leaves and flowers of *Monarda menthæfolia*. An investigation into the constituents of this extract led to the isolation of the following:

(1) A volatile oil
(2) Non-saponifiable matter
(3) Linoleic acid hexabromide
(4) Linoleic acid tetrabromide
(5) Unknown brominated acid melting at 95–95.5° C.
(6) Oleic acid dibromide
(7) Hydrothymoquinone
(8) Solid fatty acids
(9) Pigment melting at 216–218° C.
(10) Pigment melting at 204–205° C.

PART II. ALCOHOLIC EXTRACTIVE OF MONARDA PUNCTATA **var.** LEUCANTHA.

During the autumn of 1933 a quantity of *Monarda punctata* **var.** *leucantha* was collected near Gainesville, Florida. The identification of the plant was confirmed by Professor Erdman West of the Agricultural Experiment Station, Gainesville, Florida.

The plant material, after comminution, was extracted with hot alcohol by decoction and subsequent expression in a lard press. After the removal of the excess alcohol there remained 1480 Gm. of extractive matter.

Petroleum-Ether-Soluble Extractive.—The extract above was extracted with petroleum ether (b. p. 60–70° C.). 300 Gm. of extractive were obtained after distilling off the excess petroleum ether.

The petroleum-ether extractive was next saponified using 50 Gm. of potassium hydroxide in two liters of alcohol. When saponification was complete, excess alcohol was removed by distillation and water was added to dissolve the soaps.

The Non-Saponifiable Matter.—The soap solution obtained above was now shaken with ether to remove the non-saponifiable material. After repeated shaking with ether, the ether solutions were united and dried over anhydrous sodium sulphate. The ether was removed by distillation.

The non-saponifiable matter was now steam distilled to obtain the volatile oil which is found here since the alcohols and hydrocarbons as well as the phenols, thymol and carvacrol, are soluble in ether and are extracted from alkaline solution by ether. In this manner 10 Gm. of oil were obtained.

Thirty Gm. of the non-saponifiable matter were acetylated by refluxing for two hours with acetic anhydride. When the acetylation was complete the mixture was poured into water, boiled and washed with warm water to remove the acetic anhydride.

After washing, the acetylated product was recrystallized a number of times from alcohol. In this way, several fractions were obtained which were the most soluble in alcohol and melted at approximately 90° C. There was also a fraction which melted at 110° C. The melting point of the latter fraction could not be raised by recrystallization.

Since sterols generally yield acetates melting higher than 110°, this fraction was saponified. The saponification value was 110. This would correspond to an alcohol with an atomic weight of 497 or about 33 carbon atoms. From the saponification mixture the alcohol or sterol was reclaimed and recrystallized. It melted at 68–70° C. (see Harwood (2)). The quantity of the material would not permit a thorough investigation into the properties of this substance but it is probable that the product in question is not a sterol but rather an alcohol with more than 30 carbon atoms.

By fractionally recrystallizing the acetates melting near 90° C., fractions were obtained which melted from 70° to 90° C. It is doubtful whether these are sterols or alcohols similar to that spoken of above.

Some of the products insoluble in alcohol were probably hydrocarbons.

The Saponifiable Matter—Fatty Acids.—After the removal of the non-saponifiable matter of the petroleum ether extract, the alkaline aqueous solution of the soaps was acidified with hydrochloric acid. The free fatty acids floated to the top of the liquid and were extracted with ether. The ether solution was dried over anhydrous sodium sulphate and then the ether was removed by distillation. In this way 180 Gm. of the fatty acids were obtained.

One hundred Gm. of the free fatty acids were dissolved in 750 cc. of alcohol in which 100 Gm. of lead acetate had been dissolved. The resulting solution was set aside in the cold at a temperature of 10° over night. The lead salts of the solid fatty acids, the precipitate, were removed by filtering and washed with cold alcohol. The liquid fatty acids were present in the filtrate as their lead salts.

The Solid Fatty Acids.—The lead soaps which were insoluble in alcohol at 10° C. were freed of lead by suspending in water acidulated with hydrochloric acid. The acid mixture was then shaken out with ether to remove the solid fatty acids. The resulting ether solution was dried over anhydrous sodium sulphate and then freed of ether by distillation.

In order to prepare the methyl esters of the fatty acids, the acids were dissolved in anhydrous methyl alcohol. Next the resulting solution was saturated with dry hydrochloric acid gas and refluxed for an hour. The resulting solution was poured into distilled water and the insoluble esters were washed until freed of acid, taken up in ether and dried over anhydrous sodium sulfate. The resulting methyl esters were fractionally distilled under reduced pressure and then the saponification value and melting point of the liberated acid obtained from each fraction were determined. The results are presented in the following table.

TABLE II.—THE SOLID FATTY ACID METHYL ESTERS.

	Fraction B. P.	Condition at Room Temperature.	Saponification Value.	M. P. of Free Acid.
1	110–165 at 25 mm.	Liquid	206	51
2	165–195 at 18 mm.	Liquid	206	50–51
3	195–200 at 15 mm.	Liquid	197	55
4	200–215 at 15 mm.	Semisolid	191	47
5	215–230 at 15 mm.	Solid	174	52
6	230 up at 15 mm.	Solidified in condenser	137	51–52
7	Residue in flask soluble in alcohol	Solid	100	69–70

From the data obtained on the foregoing methyl esters it appears that the fractions 1, 2 and 3 contain a mixture of varying percentages of myristic, palmitic and stearic acids. Fraction 4 is probably made up mostly of palmitic and stearic

acids while fractions 5 and 6 contain principally stearic and arachidic acids. From the saponification value and higher melting point of fraction 7 there may be solid fatty acids as high or higher than arachidic acid in the mixture.

Liquid Fatty Acids.—The liquid acids obtained above in ether solution were chilled to 0° C. after drying. Then a solution of bromine in acetic acid at 0° C. was run in dropwise with stirring until an excess of bromine was present. The resulting solution was set aside in an ice box over night whereupon a precipitate formed. The insoluble crystals were filtered off, washed with ether and dried. They melted at 180–181° C. Linoleic acid hexabromide melts at 180–182° C.

The ethyl ether was removed from the brominated fatty acids and then an equal quantity of petroleum ether was added to the residue. A semisolid portion separated out on the bottom of the container and this was removed and later a second deposit was also removed. These substances melted at a temperature of 134–136° C. This is unusual because the customary unsaturated acids have never yielded a bromide melting in that range according to reports. However, there is a reported bromide from the fats of chaulmoogra oil which melts within this range. The bromine content of the samples was not determined due to lack of material.

The solution after the removal of the above substances was freed of petroleum ether by distillation. The resulting red oil weighed 48 Gm. It is oleic acid dibromide.

Ether Extract.—After the removal of the petroleum-ether-soluble portion of the alcoholic extract, ethyl ether was used to extract the residue. By repeated extraction, 130 Gm. of the extract was obtained. The greatest part of this latter extract was soluble in carbon tetrachloride.

Since hydrothymoquinone has been found in the extracts it was possible that it might be found here. Consequently, the extract was boiled in water and the hot water solution was filtered boiling hot. It was found that there was no hydrothymoquinone present. The above treatment rendered the ether extract into a water-soluble and water-insoluble portion.

The water-soluble portion of the extract turns cherry red when treated with potassium hydroxide solution, and when the alkaline solution is heated a small amount of ammonia gas is given off. The original solution was distinctly acid to litmus.

Lead acetate was used to precipitate the aqueous solution. After the precipitation the lead was removed from the solution by passing hydrogen sulfide through it. The precipitate was also freed of lead by suspending in water and passing hydrogen sulphide through the suspension. After filtering the above two mixtures to remove the lead sulphide, the resulting solutions were evaporated to dryness. The solutions probably contained tannins and their derivatives because the resulting products gave a green color with ferric chloride. Otherwise, there was no satisfactory evidence inasmuch as these products were semisolids and could not be crystallized.

No tests for glucosides were obtained by using hydrolysis and reducing tests.

Chloroform Extract.—The residue remaining after the ethyl ether extraction was extracted with chloroform; 150 Gm. were obtained but nothing was separated from the extract.

Ethyl Acetate Extract.—After the chloroform extraction was completed, an attempt was made to extract the residue with carbon tetrachloride. The extract was so small that it was added back to the residue and the whole was then extracted with hot ethyl acetate. Upon evaporation and cooling of the ethyl acetate solutions, a white precipitate formed. By repeated evaporation and crystallization, 25 Gm. of the substance was obtained.

The substance above was insoluble in hot and cold water, soluble in alcohol and insoluble in ether. In attempting to run a melting point it blackened at 250–260° C.

No further information was obtained concerning the alcoholic extractive.

SUMMARY AND CONCLUSIONS.

An alcoholic extract was prepared from the entire plant of *Monarda punctata* var. *leucantha*. After investigating, the following substances were found to be present:

(1) A volatile oil
(2) Possibly sterols
(3) High alcohols
(4) Hydrocarbons

(5) Probably the following fatty acids:
  (*a*) Myristic
  (*b*) Palmitic
  (*c*) Stearic
  (*d*) Higher acids including arachidic
(6) Linolenic acids
(7) An unsaturated fatty acid whose bromide melts at 134–136° C.
(8) Oleic acid
(9) A product from ethyl acetate extract that has not been characterized
(10) No lecithin
(11) No hydrothymoquinone.

PART III. MISCELLANEOUS DETERMINATIONS.

As a preliminary study *Monarda menthæfolia* plant parts were submitted to the Dragendorf selective solvent analysis. As a result the following results were obtained.

TABLE III.—SELECTIVE SOLVENT DETERMINATIONS, MONARDA MENTHÆFOLIA.

Determination.	Flower Heads.	Leaves.	Stems.
Petroleum Ether	4.27	5.68	2.70
Ethyl Ether	2.11	2.22	0.55
Chloroform	0.43	1.09	1.11
Alcohol	24.76	16.17	11.26
Water	9.63	12.37	3.00
Aqueous KOH (2%)	26.59	30.36	35.73
Aqueous HCl (1%)	5.55	8.66	10.44
Dregs	16.65	13.16	25.05
Moisture	10.57	10.21	9.11
Total	100.56	99.92	98.95

NOTE: Percentage results by averaging two determinations.

Also in connection with the present investigation some determinations on structural elements were run. These determinations include:

1. The A. O. A. C. Pentosan determination as recommended by the Association of Plant Physiologists (3).
2. The A. O. A. C. Tannin determination (4).
3. The U. S. P. X Crude Fiber Determination.
4. The Crude Fiber Determination, the so-called "Dutch Method" of Wallis and Goldberg (5).

The crude fiber determinations are empirical and results are dependent upon the method used.

Results obtained are tabulated in Tables IV and V.

TABLE IV.—MISCELLANEOUS DETERMINATIONS, MONARDA MENTHÆFOLIA.

Determinations.	Flower Heads.	Leaves.	Stems.	Roots.
Pentosan	10.09	8.59	17.42	16.44
Crude Fiber				
U. S. P.	12.65	10.62	42.32	35 74
Dutch Method	10.43	9.20	28.69	23.52
Tannin	2.90	4.85	3.89	6.30

TABLE V.—MISCELLANEOUS DETERMINATIONS, MONARDA PECTINATA.

Determination.	Flower Heads.	Leaves.	Stems.	Roots.
Pentosan	11.98	17.10	25.16	30.00
Crude Fiber				
U. S. P. X	26.96	15.32	45.74	47.03
Dutch Method	16.77	13.64	26.77	29.18
Tannin	1.23	3.11	2.87	2.39

SUMMARY AND CONCLUSIONS.

The results of preliminary examinations and standard tests for the customary plant constituents are tabulated. The Dragendorff determinations are run on the leaves, stems and flower heads of *Monarda menthæfolia* and the pentosan, crude fiber and tannin determinations are run on the parts of the plant of both *Monarda menthæfolia* and *Monarda pectinata*. The Dutch Method for the determination of crude fiber gives consistently lower results than the official U. S. P. method.

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SELENIUM DISTRIBUTION IN AND SEASONAL VARIATION OF TYPE VEGETATION OCCURRING ON SELENIFEROUS SOILS.*,[1]

BY O. A. BEATH,[2] H. F. EPPSON AND C. S. GILBERT.

In previous references (1, 2, 3) relating to the occurrence of selenium in native range plants no significant data were given as to its distribution in the plant itself nor was there offered at that time or since definite experimental evidence as to fluctuations of selenium with seasonal growth and development. This presentation, therefore, is an attempt to show that the amount of selenium in a seleniferous plant is not constant nor is its distribution in the plant uniform in any one part during a growing season. Many qualifying statements are necessary in attempting to show the quantitative assignment of selenium in the native range plants as they exist under natural conditions.

Geological Correlations.—The authors (1, 2, 3) in earlier publications have advanced experimental evidence to show that some native range plants, not necessarily generically related, absorb selenium in varying amounts when occurring upon shales and soils of a definite geological classification. These formations outcrop in many sections of the Rocky Mountain region. At the present time these include rocks of Cretaceous and Eocene ages and in addition two strata in the Chugwater formation. The latter is whole or in part of Permian or Triassic (?) age. The authors have stressed the fact that in dealing with seleniferous plants there are a few that stand out in their normal affinity for selenium. They constitute, therefore, a major group (Fig. 1) of positive selenium carriers. A seleniferous plant, for example, *Oonopsis condensata* will yield a comparatively low selenium value when collected on any member of the Benton, Mesaverde or Ferris

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geological formations. The same species taken at random on type Steele, Niobrara or Morrison shales will be uniformly higher in selenium for similar stages of growth. It has also been pointed out that there are areas within seleniferous shale complexes where the selenium content of much of the indigenous vegetation is surprisingly high.

Additional Native Seleniferous Plants.—The seleniferous native range plants of major significance occurring on the geological formations mentioned above, that absorb selenium in comparatively large amounts and apparently independently of intermediate influences were first

Fig. 1.—Four of the major seleniferous native range plants occurring closely associated.

reported by the authors in February 1934. It is now known that *Aster commutatis* and *Atriplex canescens* occurring on the Pierre shale consistently carry sufficient selenium at any stage of their growth to be suspicious as livestock hazards and as contaminators of the soil about them. *Aster commutatis* and *Atriplex canescens* have not been examined for selenium on any other shale than the Pierre. Other *Aster* and *Atriplex* species have not been found to consistently absorb selenium in toxic amounts from other shales and soils. In some critical toxic plant areas *A. Nuttallii* has been found to yield as high as 930 parts per million of selenium. This result was obtained from air-dried material, and consequently it is not known how much selenium was lost upon drying. On the other hand, many collections of this species have been made from normal seleniferous soils with negative or inconsequential results for selenium.

Factors Involved in Reporting Selenium in Range Vegetation.—It is apparent that a selenium value assigned to any one of the group of native range plants classified as high absorbers of selenium has limited significance unless such analyses are accompanied by the following collateral data: (1) geological formation, (2) age of plant (as indicated by size and physical character of roots), (3) green or air dried when analyzed, (4) stage of growth (early growth, flowering, seeding, etc.), (5) part of plant analyzed (root, foliage, seeds, etc.), and (6) if thrifty or stunted. That such data[1] are highly significant may be seen from the experimental evidence that follows.

(*1*) *Geological Formation—Astragalus racemosus* (*Tium racemosus* of Rydberg), collected at the pre-bloom stage on two types of shale gave for:

Benton shale	142 p. p. m. selenium
Niobrara shale	3140 p. p. m. selenium

Woody aster (*Xylorhiza Parryi*) collected at the pre-bloom stage of growth gave for:

Fort Union shale	13 p. p. m. selenium
Pierre shale	2300 p. p. m. selenium

[1] The quantitative results given in this paper are expressed in parts per million (p. p. m.) selenium calculated to a bone-dry basis for plants, and to air-dry basis for soils. The methods of analyses used are given in a previous publication (3), the plant material being digested by the Van Kleeck method.

The chemical analyses were made from the composited foliage of air-dried samples. The plants were grown under similar climatic conditions in eastern Wyoming. Analysis of other seleniferous plants such as are illustrated by species of *Atriplex*, *Astragali* and *Stanleya* have shown these same general trends in their selenium-soil associations.

(*2*) *Age of Plant.*—The size of a plant, as referred to under this heading, is interpreted as an index to the relative age of a particular species, that is, whether young, partially or wholly developed.

Astragalus bisulcatus (*Diholcos bisulcatus of Rydberg*) was selected to study the variation in the selenium content of different sized plants under the same soil conditions and similar stages of growth. Analysis of samples undried:

Foliage, past bloom for,

Moderately large plants	2920 p. p. m. selenium
Medium-sized plants	1280 p. p. m. selenium
Small-sized plants	477 p. p. m. selenium

Corresponding roots from same composites,

Moderately large roots	444 p. p. m. selenium
Medium-sized roots	172 p. p. m. selenium
Small-sized roots	75 p. p. m. selenium

While this experiment was limited to but one species, it indicates that the more mature plants, including roots, are more seleniferous than the smaller or less mature plants. In all cases the above samples represent thrifty plants.

(*3*) *Green or Air Dried When Analyzed.*—The loss of selenium from the time certain plants are collected until air dried may be as much as sixty-six per cent and varies with different plants, the season and stages of growth. In the spring time the green seleniferous plants that happen to grow in a field that is to be plowed up for subsequent seeding become potential contributors of available organic selenium. An analysis for selenium made upon such samples, particularly those containing volatile selenium compounds, after air drying, falls short of relating the correct interpretation of actual conditions. From the point of view of livestock poisoning the same line of reasoning pertains. If eaten at all, they are for the most part, ingested green. A correct approach to the hazards of a seleniferous range must be based upon prevailing conditions. Usually the early succulent plants show a greater selenium loss upon drying than the more mature fibrous plants. When these seleniferous range plants are thoroughly dried out, the loss of selenium is appreciably less thereafter, if the material is kept in a dry place in closed containers. Composite samples of *A. bisulcatus* at three stages of growth gave the following results:

	Green.	Air Dry.	
Pre-bloom	8840	5965	p. p. m. selenium
Full bloom	6590	3630	p. p. m. selenium
Past seeding	595	543	p. p. m. selenium

These figures show very clearly the selenium variation not only in a season's growth, but a marked loss of it during the curing process. All collections were made from the same soil environment on range plats set aside for purposes of this kind.

A composite sample of *Astragalus racemosus* collected at pre-bloom stage and analyzed green gave the following loss upon air drying:

Green.	Air Dry.	
14,920	13,900	p. p. m. selenium

A composite sample of *Xylorhiza Parryi* collected in its initial stage of growth gave the following results:

Green.	Air Dry.	
1744	1275	p. p. m. selenium

Stanleya bipinnata under similar conditions gave:

Green.	Air Dry.	
3460	1320	p. p. m. selenium

Oonopsis condensata at its early stage of growth gave:

Green.	Air Dry.	
2290	888	p. p. m. selenium

These five examples are representative of the principle native seleniferous range plants. A loss of selenium upon curing has been found to occur in every case. This loss is highly important to the analyst in arriving at the actual selenium occurrence in native range plants.

(*4*) *Stage of Growth.*—Some seleniferous range plants give high selenium values in their early stages of growth and then gradually decline. Others reach a maximum selenium content at later stages of development.

Woody aster samples above-ground portion, composited from the same soil environment and analyzed air dry were found to vary from 2090 p. p. m. initial growth (May) to 79 p. p. m. for past seeding plants (September).

A typical composite sample of *Astragalus pectinatus* was studied in the same manner as to its seasonal variation under the same soil and weather conditions. Plants were in the flowering stage (June) when the first sample was collected. Analyzed air-dry 1062 p. p. m. selenium were found The next collection past seeding was made in October. Only 40 p. p. m. selenium were obtained.

Oonopsis condensata is representative of those seleniferous plants that do not reach their maximum selenium content until the flowering period as is indicated by the results that follow:

Pre-bloom—June	2290 p. p. m. selenium
Full bloom—August	4800 p. p. m. selenium
Past seeding—December	1585 p. p. m. selenium

These analyses were made on undried material and collected from the same experimental range plat.

Aster commutatis collected at four distinct stages of growth during the 1935 season from the same soil area gave the following results:

Initial growth—May	590 p. p. m. selenium
Pre-bloom—June	273 p. p. m. selenium
Full bloom—August	233 p. p. m. selenium
Seeding—November	15 p. p. m. selenium

It is apparent from these several tests that the stage of growth of a seleniferous plant is a most important adjunct in the study of selenium occurrence in range vegetation.

(*5*) *Part of Plant.*—The following tests were made to determine how selenium was distributed in the various parts of a typical seleniferous range plant. The first analysis was made upon *Astragalus pectinatus* at a stage of growth characterized by the fruiting period. Four divisions of the plant were made, *viz.*, green fruit, stems, leaves and roots. Analyzed green the results for selenium were as follows:

Fruits	612 p. p. m. selenium
Stems	339 p. p. m. selenium
Leaves	374 p. p. m. selenium
Roots	594 p. p. m. selenium

Fig. 2.—*Astragalus pectinatus* is deep rooted and a very consistent absorber of selenium in seleniferous shales.

From the same soil area a second collection was made of approximately one hundred pounds of *A. pectinatus* at a stage of growth when the pods were beginning to disperse their seed. The above-ground portion was separated into three divisions as follows: leaves and stems, seeds and pods. The air-dried samples were then analyzed for selenium:

Pods.....	124 p. p. m. selenium
Foliage (leaves and stems)..	260 p. p. m. selenium
Seeds.....	3250 p. p. m. selenium

Another collection of this same vetch was made in October from another soil area. At this season the foliage was considerably dried out. The main roots were included in the collection. The undried samples gave the following selenium analyses:

Foliage (leaves and stems)..	886 p. p. m. selenium
Basal roots...	5570 p. p. m. selenium

The photograph (Fig. 2) illustrates the general habitat of *A. pectinatus*.

Seeds from *A. bisulcatus* collected at a time when the foliage was mostly dried out gave 2640 p. p. m. selenium. This collection was made from the same soil area as the first collection of *A. pectinatus* referred to above.

During the late fall *A. bisulcatus* and related *Astragali*, such as *A. racemosus* and *A. scobinatulus* produce a regrowth of tender shoots that may remain green for a considerable time. Attention (3) has been called to the regrowth of certain *Astragali* and the consequences that follow if eaten by livestock. During the past fall tests were made to determine the selenium content of a representative regrowth and to compare its seleniferous character with that of the old stems and accompanying roots. (See Fig. 3.)

The samples were analyzed undried:

Results:

Old stems.....	255 p. p. m. selenium
Regrowth.....	8000 p. p. m. selenium
Roots.....	800 p. p. m. selenium

The amount in the regrowth (green) compares quite closely to that found to occur in the same species at the early stages of growth in the spring of the year (8840 p. p. m.). In this connection it must be kept in mind that comparisons of this kind must be based upon similar weather conditions and seleniferous soil types.

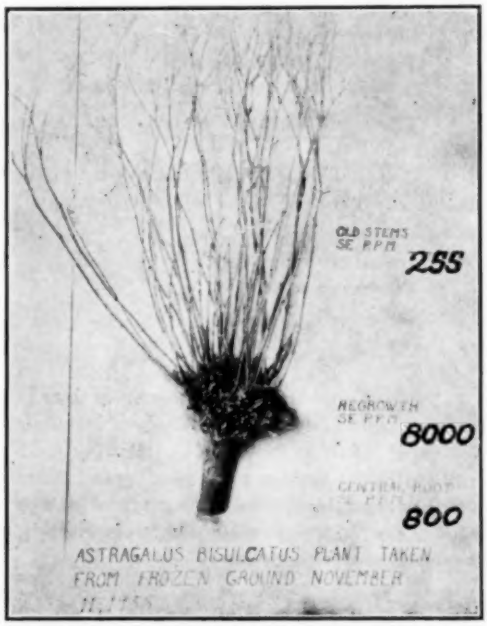

Fig. 3.—An *Astragalus bisulcatus* plant as it appears during the fall months. The regrowth is particularly attractive to grazing livestock.

The roots of *O. condensata* at the full bloom stage of growth were found to be as seleniferous as the above-ground portion for a particular composite sample collected on a type Niobrara geological shale formation. Both gave the same results, *viz.*, 4800 p. p. m. selenium. The samples were analyzed green.

From these several tests it is concluded that the total selenium in seleniferous range plants is not generally distributed uniformly throughout the entire plant structure, that the distribution of selenium in the various plant parts varies in the different species of seleniferous range plants.

(6) *Plant Thriftiness vs. Selenium Content.*—As a general rule the authors have found that a favorable growing season, initiated by an abundance of moisture, is conducive to a comparatively higher selenium absorption in plants than pertains to warm dry weather sequences. During the past four years only one growing season has been recorded that was markedly favorable to range plant development. Most of the seleniferous plants are deep rooted. Favored by an abundance of spring moisture, growth becomes vigorous and is sustained for a long time even though arid conditions prevail thereafter. The highest selenium averages in native range plants were obtained during the 1935 season which was ideal for range plant development.

Seleniferous Farm Crops.—The authors have referred, in earlier publications (2, 3) to the fact that native range plants having an avidity for selenium become activated in their poisonous properties, to a degree, quite parallel to the selenium intake. Two general types of livestock poisoning thus result, *viz.*, the acute and chronic. Both of those forms have been described in earlier references (1, 3, 5).

Fig. 4.—Seleniferous vegetation on Pierre loam being plowed under green, preparatory for the seeding of a cereal crop. The ash from burned weeds is easily discerned.

Selenium as it occurs in ordinary farm crops such as wheat, oats, barley, grasses and vegetables does not volatilize upon drying. This is in direct contrast to those seleniferous range plants that do contain highly volatile compounds of selenium. Seleniferous cereals and forages may, therefore, be cured without danger of loss of selenium. The toxic effect produced by feeding seleniferous cereals and forages to livestock is of the chronic type. Definite characteristic symptoms result which differ in many essential ways from those caused by seleniferous range weeds. The occurrence of high concentrations of selenium in certain native range plants has introduced an additional hazard apart from their effects upon grazing livestock. This hazard is one resulting in soil enrichment through the years by the decay, weathering and leaching of seleniferous range plants. The form of selenium in this group of plants is largely organic and quite completely soluble in water.

The ash remaining after burning miscellaneous seleniferous weeds may also contribute available selenium to soils. Such a condition is illustrated in Fig. 4. The dried-out weeds were burned previous to plowing. A composite ash sample gave 19 p. p. m. selenium.

Seleniferous Native Range Plants as a Source of Selenium for Farm Crops.—Referring to the photograph in Fig. 4 it will be observed that in this particular field green vegetation is being plowed under along with dried-out vegetation. The dominant green plants are *A. racemosus* and *S. bipinnata*. A composite sample of *A. racemosus* from this field, gave when analyzed green, 14,920 p. p. m. selenium. A composite sample of *S. bipinnata* likewise analyzed gave 1163 p. p. m. selenium. In 1934 wheat was grown in this field. It was highly toxic. In 1935 a crop of corn was raised. It, too, was toxic. The question could be raised at this point as to whether or not the farm crops might not have absorbed selenium quite independently of the seleniferous weeds. Reference to Fig. 5 will show that normally such absorption does not occur. The experiment, as illustrated in part, by this photograph, shows that ordinary farm crops are incapable of absorbing enough selenium from naturally occurring seleniferous shales to become toxic. In this experiment, three types of seed were sown, *A. racemosus*, *O. condensata* and *A. pectinatus*. The seedlings were all seleniferous after three months' growth. The shale used came from a Steele outcrop free from vegetation of any sort. Various farm crops grown upon this same Steele shale were found

by chemical analysis to contain only traces of selenium. The purpose of this experiment is to allow these seleniferous plants to grow for several years on this shale plat with the idea that they will then have produced enough available selenium through the yearly weathering and leaching of their foliage and roots to cause vegetables, cereals etc., to become seleniferous. It is not our belief that this is the only manner in which selenium is made available to ordinary forages and crops. On the other hand, these highly seleniferous range plants cannot be excluded from consideration. Further evidence in this connection is offered by the following experiment. Raw Steele shale was mixed with an excess of coarsely cut *A. bisulcatus* (green) carrying when collected 3000 to 5000 p. p. m. selenium. A crop of wheat was grown. At the conclusion of the growing season, the following results were obtained:

Wheat heads	95 p. p. m. selenium
Stems and leaves	123 p. p. m. selenium
Roots	107 p. p. m. selenium

TYPE CROPS GROWN ON STEELE SHALE SELENIUM NEGLIGIBLE IN THESE CROPS
OONOPSIS CONDENSATA GROWN FROM SEEDS ON RAW STEELE SHALE FIRST SEASONS GROWTH SELENIUM-370 P.P.M.
ASTRAGALUS RACEMOSUS GROWN FROM SEEDS ON RAW STEELE SHALE FIRST SEASONS GROWTH SELENIUM-310 P.P.M.
ASTRAGALUS PECTINATUS GROWN FROM SEEDS ON RAW STEELE SHALE FIRST SEASONS GROWTH SELENIUM-86 P.P.M.

Fig. 5.—Illustrates two significant points: (1) that ordinary farm crops do not absorb selenium in toxic amounts from raw seleniferous shales, (2) that certain native range plants do absorb selenium from raw seleniferous shales even in the seedling stages.

A control without the addition of the vetch was found to yield a wheat crop, carrying only traces of selenium.

The same conclusive results have been obtained where the soil used was of a distinctly non-seleniferous origin.

The selenium compounds in *X. Parryi*, the *Astragali*, the *Stanleyas* and species of *Oonopsis* respond to leaching with water at room temperatures. As an illustration, a coarsely ground, air-dry sample of *X. Parryi* carrying 2090 parts per million of selenium was extracted with water at room temperature. The dregs, after two macerations, were practically free from selenium, containing only 30 parts per million.

The form in which selenium occurs in the principal seleniferous range plants is mostly organic. This conclusion is based upon the fact that freshly prepared aqueous extracts do not respond in any marked degree to the usual inorganic precipitants, namely, sulfur dioxide and hydroxylamine hydrochloride.

The roots of many of the seleniferous range plants are not only high in selenium but likewise contain water-soluble selenium compounds. Consequently, the enrichment of the soil

through the decay and leaching of these highly concentrated seleniferous plants, including roots, has not only been demonstrated experimentally but has proved to be a major factor under actual farming and range conditions in Wyoming. Particular emphasis is placed upon the ease of absorption by farm crops and non-deleterious effect to them of the available selenium supplied by these native range plants.

Seleniferous Farm Crops as a Source of Selenium Enrichment.—The selenium in cereals, vegetables and forages has been found to be distributed throughout the entire plant. In some cases the roots have been found to contain more selenium than the above-ground portion. The form of selenium is known to be stable, although fifty per cent or more may be dissolved in water at room temperatures. The following tests on solubility were made from seleniferous wheat that had a selenium distribution as follows:

Grain	28 parts per million selenium
Stems and leaves	19 parts per million selenium
Roots	25 parts per million selenium

Macerating a portion of the wheat grain with water at 25° C. and the subsequent preparation of a clear aqueous extract gave upon analysis 14 parts per million of selenium. This represents one-half of the total selenium in the original wheat.

A composite sample of mature wheat plants from another source was analyzed for selenium with the following results.

Grain	35 parts per million selenium
Stems and leaves	17 parts per million selenium
Roots	36 parts per million selenium

This grain had also approximately fifty per cent water-soluble selenium. The selenium in the stems and leaves was found to be mostly soluble in water.

Wheat grown on a shale plat fertilized with green seleniferous *A. bisulcatus* was sampled when about one-half developed. The above-ground portion analyzed 300 parts per million selenium. Sixty per cent of this amount was soluble in water.

Wheat grass hay (90 bales) from eastern Wyoming was found to carry an average selenium content of 15 parts per million. This particular hay was selected because it had grown in and around the native seleniferous plants *Atriplex canescens* and *Aster commutatis*. Before being harvested it was found that samples taken from the soil in close proximity to these plants was more seleniferous (37 p. p. m.) than the samples taken outside this influence (2–5 p. p. m.). Representative composite samples were macerated with water at 25° C. and expressed. From the clarified extracts it was possible in all tests to obtain fifty per cent or more of the total selenium in the water-soluble form. In addition to this, ground hay and hay extracts were used as a source of selenium for growing wheat. A non-seleniferous soil mixed with pulverized seleniferous hay was sown to wheat. Seedling wheat plants when analyzed gave 4 p. p. m. selenium. Following this test, hay extracts were added and a second planting of wheat was made. Seedling plants contained 16 p. p. m. selenium. Hence selenium from roots, stubble and miscellaneous vegetation left in cropped fields is a potential and continuous source of available selenium for succeeding crops.

Fig. 6.—Bean plants grown in a Morrison shale with and without sulphur. Source of available selenium in soil supplied from seleniferous *Astragalus bisulcatus*.

Influence of Sulfur and Soluble Sulfates upon Selenium Absorption.—Seleniferous native range plants commonly occur on geological formations which are highly sulfated. In some

instances their roots may be found embedded in gypsum seams, yet the authors have found no correlation regarding their selenium intake and sulfur or soluble sulfates.

On the other hand, it has been conclusively demonstrated that sulfur and soluble sulfates do not curtail selenium absorption by type crops when the source of available selenium is supplied through seleniferous plants typified by certain *Astragali*. In fact, the tendency is to *increase* the selenium intake rather than to retard it. The following experiment illustrates this point.

Selenium Content of Wheat (young plants) Grown on:

1.	Morrison shale	2 parts per million selenium
2.	Morrison shale + Vetch	227 parts per million selenium
3.	Morrison shale + Vetch + Sulfur (0.5%)	432 parts per million selenium
4.	Morrison shale + Vetch + Na_2SO_4 (0.5%)	300 parts per million selenium
5.	Morrison shale + Vetch + $MgSO_4$ (0.5%)	305 parts per million selenium
6.	Morrison shale + Vetch + $MgSO_4$ (0.4%) + Monsells salt (0.7%)	217 parts per million selenium
7.	Morrison shale + Vetch + Monsells salt (0.7%)	318 parts per million selenium

Other crops grown under similar conditions have given the same general trend in the final results.

In the experiment with beans (Fig. 6) it was found that the roots from these plants, grown in the sulfur-treated soils, gave 336 parts per million of selenium. This was more than twice the amount present in the corresponding foliage and nine times more than occurred in the foliage of the beans grown in the non-sulfur treated soil. Beans grown on Morrison shale alone gave 2 parts per million selenium. It is not believed that these results relating to selenium absorption in the presence of an excess of sulfur or soluble sulfates where the source of selenium is supplied through and by the organic forms occurring naturally in certain range plants can be ignored in evaluating the natural conditions under which seleniferous farm crops and forages are grown. In fact, there is as yet no published evidence that the application of sulfur or soluble sulfates *on a farming scale* has shown any tendency to inhibit selenium absorption by wheat or other farm crops.

SELENIUM AND CHLOROTIC VEGETATION.

Inorganic selenium compounds at certain concentrations in soils cause cereals, forages and vegetables to become stunted and chlorotic. The authors have grown wheat to maturity where 10 parts per million selenium were added to a soil as sodium selenite. No deleterious effect was noted during the development of the wheat. At the rate of 20 parts per million wheat grain germinated normally, and the subsequent growth was somewhat retarded but not chlorotic. When the selenium application was increased to 40 parts per million in the form of sodium selenite, it was found to have a decided effect upon the germination of the wheat. The plants that survived were stunted and chlorotic.

Stoklasa (4) mentioned the occurrence of discolored seleniferous plants in areas where a low grade of coal containing pyrites of iron had burned. Presumably the residual ash contained selenium as the inorganic selenites and selenates.

Of the seleniferous native range plants occurring in Wyoming, only one has been found so far that has given an abnormal reaction to cereals, grasses and vegetables when used as the source of available selenium. When this plant or water extracts from it are used, seed germination is retarded and the plants that survive are stunted and chlorotic. In addition to its selenium content, it is always a heavy carrier of molybdenum. Whether chlorosis is due to its inherent selenium or molybdenum compounds, or to the acidic character of the plant itself is not known. The plant referred to is *Oonopsis condensata*. On the natural ranges,

O. condensata after once being firmly established completely dominates the forage cover.

Native seleniferous range plants carrying up to 15,000 p. p. m. selenium, show no chlorosis.

Organic compounds of selenium, developed by certain native range plants of the Rocky Mountain region, not only supply the soil with available selenium where these plants grow, but, in addition, their presence in excess does not cause discoloration or chlorosis. In some instances cereals and forages are greatly stimulated, but this may be due to other factors than selenium activation.

SELENIUM, NATURAL OCCURRENCE.

Elemental selenium, in a limited number of analyses, has not been found to occur to any extent in the seleniferous soils of Wyoming. As a matter of scientific interest, two experiments have been completed involving elemental selenium. In one test a non-seleniferous soil was mixed with finely powdered elemental selenium at the rate of 25 parts per million. To this was added an excess of partially decomposed horse manure, and the whole kept moist for several months. Wheat was then sown. It was cut when the wheat was about eight inches in height. Analyzed for selenium, 6.3 parts per million were obtained. It would appear that some oxidation of the selenium had taken place. The wheat plants in the control plat without the elemental selenium were non-seleniferous. The horse manure contained no selenium. This point is important, since it has been found that sheep and cattle feeding upon seleniferous feeds excrete appreciable amounts of selenium in the feces. As high as 11 parts per million selenium have been recovered from the feces of cattle that were fed seleniferous hay.

The other test on elemental selenium was as follows: A non-seleniferous soil was mixed with 25 parts per million elemental selenium and sown with seeds of *A. bisulcatus* and *A. pectinatus*. In three months' time the seedlings were seleniferous. A composite sample gave 1150 parts per million selenium. No fertilizer was used. This test demonstrates the avidity certain *Astragali* have for selenium.

Availability of Inorganic and Organic Selenium.—Concurrently with natural processes of weathering of the crude seleniferous shales as they occur in the Rocky Mountain region, it would be logical to anticipate the presence of inorganic selenium compounds and elemental selenium.

To what extent soluble inorganic selenium compounds retain their identity as such is problematical, as is indicated in the test given below. A humus soil was mixed with a solution of potassium selenite so that the resulting mixture contained 10 p. p. m. as selenium. A crop of seleniferous wheat was grown. The crop, including roots, was removed after the wheat had matured. Composite soil samples were taken and analyzed for total selenium. The results were as follows:

Inches.	Parts per Million Selenium.
0– 6	18.7
6–12	4.5
12–18	1.3
18–24	0.9

The first six inches of soil was found to contain four times as much selenium as the second six inches.

A composite was next made up by mixing samples taken from the surface foot of soil and then leaching thoroughly with water. The soil extract was then analyzed for selenium. Only 0.26 of a part per million selenium was obtained. The leached soil was then distilled with *HBr-Br*

to remove the remaining selenium. However, for its complete removal digestion with nitric acid was necessary. While this is but one test, yet it is in agreement with observations made in connection with other natural soil profiles in indicating that a pronounced change takes place in the solubility of inorganic selenium compounds in certain soils. Either there are chemical changes involved or colloidal retention phenomena.

In the experimental work carried on by the authors over several years on the availability of selenium to farm crops it was observed in a general way, that of the two forms of selenium, *viz.*, inorganic and organic, a considerable variation occurred in their relative absorption by cereals when comparable quantities of the two forms were present in soils. In order to acquire specific data on this relationship the following experiments were made. Two plats were prepared in one of which was placed a mixture of Steele shale and green chopped seleniferous *A. bisulcatus* in the top foot of soil. In the other there was used for the upper foot a mixture of non-seleniferous loam and a sufficient quantity of a solution of potassium selenite so that the concentration was approximately 10 p. p. m. as selenium. Wheat was planted in both these plats and when mature was pulled up and analyzed for selenium. The results were:

	A. Bisulcatus Plat.	Potassium Selenite Plat.
Roots.....	107 p. p. m.	36 p. p. m.
Stalks.....	123 p. p. m.	17 p. p. m.
Heads.....	95 p. p. m.	19 p. p. m.

Composite samples of the soils from these plats were also taken. The total selenium content as determined by digestion and distillation with hydrobromic acid and bromine followed by nitric acid treatment was as follows:

	A. Bisulcatus Plat.	Potassium Selenite Plat.
0″– 6″.....	7.1 p. p. m.	18.7 p. p. m.
6″–12″.....	8.0 p. p. m.	4.5 p. p. m.

The results support the general observations made in connection with the availability of selenium to farm crops that the organic form of selenium is more readily absorbed than the inorganic.

Reference has been made to the seleniferous vegetation occurring in Germany on soils associated with burned lignitic coal residues. In Wyoming there are extensive areas of burned, low-grade, lignite coal seams occurring in the Fort Union geological formations. A typical unburned lignite vein in this formation gave 10 parts per million selenium. Many collections of vegetation have been made from the Fort Union "clinker beds," but in most instances no selenium has been detected. The selenium content of *A. bisulcatus* has been found to be practically the same, whether growing on the burned or unburned Fort Union shales. The conditions mentioned by Stoklasa (4) do not seem to carry the same interpretations for burned over low-grade ferruginous lignite in Wyoming.

Form of Selenium Compounds Occurring in Highly Toxic Areas.—Reference (3) has been made to several limited areas in Wyoming that carry a vegetative cover of abnormally high selenium values. The observer inspecting one of these areas would not detect any marked change in the continuity of the geological formations, or note any perceptible change in the character of the vegetation.

A type area in south central Wyoming was selected to determine the forms of selenium occurring in a soil profile. Because of the uneven topography involved, no attempt was made to sample the entire area. The point chosen was about the center of the poison area on the side of a cut bank. In the following table the analyses represent the total selenium found at one-foot intervals to a depth of seven feet.

1st foot	1.40 parts per million selenium
2nd foot	1.08 parts per million selenium
3rd foot	2.64 parts per million selenium
4th foot	6.40 parts per million selenium
5th foot	17.80 parts per million selenium
6th foot	4.70 parts per million selenium

The high selenium concentration at the fifth foot is significant in that 13.9 parts per million selenium were soluble in water. Examined further it was found that 65 per cent or 9 parts per million was inorganic selenium and the remainder organic selenium. This is the largest proportion of water-soluble selenium compounds the authors have found in any seleniferous area so far examined.

The origin of these highly seleniferous areas is problematical. Two of the worst offenders occur on the Wasatch geological formation. One interpretation advanced by the authors is that these enriched beds are residuals due to the leaching of seleniferous vegetation that may have been present during Wasatch time. Its preservation may have been aided by the impervious overlying compact shales. The other suggestion as to origin advanced by the authors is that these enrichments may have developed more recently, in fact, may be operative at the present time by the gradual accumulation of selenium from decayed vegetation, weathering processes and bacterial activity.

CONCLUSIONS.

1. A quantitative selenium assignment for a seleniferous range plant requires not only a knowledge of range associations but specific information regarding the plant itself.
2. Selenium compounds in seleniferous range plants are dominantly organic.
3. Selenium in native seleniferous range plants is readily soluble in water at room temperatures. In this form it is available to and definitely absorbed by farm crops and forages. Even when applied in relatively large amounts such crops are non-chlorotic.
4. Sulphur and soluble sulfates in the presence of organic selenium derived from native range plants and illustrated by *A. bisulcatus* have been found *not* to inhibit selenium absorption by type cereals and other farm crops.
5. In several type seleniferous farm crops the combined selenium was found to be partially soluble in water at room temperatures. In most cases more than fifty per cent could thus be isolated in hay, cereals, straw and vegetables.
6. Aqueous extracts from seleniferous hay were, when added to a non-seleniferous soil, capable of supplying growing wheat plants with available selenium.
7. Cattle and sheep excrete appreciable quantities of selenium in the feces when fed seleniferous hay.
8. Elemental selenium added to a non-seleniferous soil resulted in seedling *A. bisulcatus* and *A. pectinatus* plants becoming seleniferous (1150 p. p. m.) in three months' time.
9. The solubility of an inorganic selenite salt was found to be greatly altered when applied to a soil.
10. Soil samples from a soil profile in a critical seleniferous poison area were studied in detail and data submitted relative to the form and distribution of selenium *in situ*.
11. The roots of certain native range plants were found in some instances to carry more selenium than the corresponding above-ground portion.
12. The roots of seleniferous cereals and vegetables, in the cases examined, were found to be distinctly seleniferous.

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THE LEAF OIL OF DOUGLAS FIR.*

BY CARL H. JOHNSON[1] AND RUSSELL A. CAIN.[2]

Pseudotsuga taxifolia (Poir.) Britt., commonly known as Douglas fir, Douglas spruce, red fir, yellow fir or Douglas pine, is a tree which grows to a height of from 180–190 feet and is from 3.5 to 6 feet in diameter. It has been introduced in various countries throughout the world but is native to the western part of North America from British Columbia to central California at altitudes of from sea level to 6000 feet. The soil and climatic conditions under which it grows vary greatly, however, a well-drained soil and a mild climate together with a moderate amount of rainfall seem to best favor its growth. It usually grows in pure dense stands although frequently it is mixed with Western hemlock.

The oil from the leaves of Douglas fir has previously been obtained and in some instances examined although the data in many cases is quite incomplete. Sweet in 1908 (1) distilled the oil from the leaves of trees growing in Washington. Besides recording a few physical constants he stated that the oil contained camphene and probably limonene. Benson in 1912 (2) subjected the oil, obtained from the leaves of Washington trees, to fractional distillation but reported no constituents. In a later paper (3) Benson together with Thompson and Wilson reported the presence of camphene and borneol in the leaf oil examined.

Schorger in 1913 (4) examined several samples of leaf oil obtained from trees growing in California. In addition to the physical constants he reported the presence of furfural, alpha pinene, beta pinene and borneol, as well as the possible presence of limonene, dipentene and acetic acid.

In 1920 Bennett (5) distilled the oil from the leaves of trees growing in England. Geraniol, bornyl acetate, either dipentene or limonene, and a trace of citral were reported as being present.

The oil from the leaves of Douglas fir, growing in Russia in the Ssuchum district, was examined in 1925 by Rutovskii, Vinogradova and Koslov (6). The physical constants were determined, but no constituents were reported as having been identified.

The following year E. Alinari (7) in Italy, found that the leaves from trees growing in that country yielded an oil which contained chiefly beta pinene together with small amounts of geraniol and nerol. Traces of unidentified higher fatty acids were also present.

EXPERIMENTAL.

The leaves and twigs, from which the oil was distilled, were gathered during the months of August and September 1934, from trees growing in the vicinity of Seattle, Washington. From 2025 pounds of the fresh material there were obtained, by steam distillation, 7374 cc. of oil which represented a yield of 0.8 per cent. The oil was yellow in color and possessed a pleasant aromatic odor.

The physical constants were determined in the usual manner and were as follows: d_{20} 0.8696; N_D^{20} 1.4732; $[\alpha]_D^{22^\circ}$ −23.5; saponification number 25.4; acid number 1.65; ester number (calculated) 23.75; per cent of ester (calculated as geranyl acetate) 8.3; saponification number

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after acetylization 63.3; per cent of total alcohol (calculated as geraniol) 17.2; per cent of free alcohol (calculated as geraniol) 10.7.

Free Acids: Capric Acid.—Extraction of the oil with a 5 per cent aqueous sodium carbonate solution and subsequent extraction of the acidified aqueous solution with ether, yielded 2.899 Gm. of a brown viscous liquid, which represented 0.33 per cent of free acids. It possessed an extremely pungent odor, and was strongly acid to litmus. Steam distillation of an ethereal solution of the residue yielded 1.01 Gm. of an insoluble volatile acid. Silver salts prepared from the insoluble volatile acid contained 37.2 and 38.0 per cent, respectively, of free silver. Silver caprate contains 38.5 per cent silver; therefore it was concluded that the precipitate consisted of the silver salt of capric acid and hence the insoluble portion of the distillate consisted chiefly if not entirely of capric acid. Although traces of soluble volatile acids may have been present in the aqueous portion of the distillate no satisfactory identifications could be made.

Phenols: Salicylic Acid.—Extraction of the oil with a 5 per cent aqueous solution of sodium hydroxide, and subsequent extraction of the acidified aqueous solution with ether yielded 0.6168 Gm. of crystalline residue which was equivalent to 0.07 per cent of phenols. The crystals, after recrystallization from ether, melted at 157° C., the melting point of salicylic acid. The addition of a few drops of ferric chloride solution to an alcoholic solution of the crystals produced a purple color. The odor of methyl salicylate was produced when the crystals were heated with a mixture of methyl alcohol and concentrated sulfuric acid. As a final test, 5-nitrosalicylic acid was prepared by heating the crystals with nitric acid. The melting point of the purified product was 224° C. Salicylic acid, therefore, was identified as the phenol present.

Fractionation.—The oil from which the free acids and phenols had been removed was washed with water and dried. The total of 948 cc. of remaining oil was separated into two parts by fractional distillation at 25-mm. pressure. That portion which boiled below 100° C. and represented nearly 75 per cent of the original oil was repeatedly refractionated and the following fractions were obtained:

Fraction No.	Boiling Point. At 25 Mm.	At 769 Mm.	Amount.	Sp. Gr. 20° C.	N_D^{20}.	$[\alpha]_D^{20}$.	Color.
I	0–75°	156–161°	119 cc.	0.8799	1.4753	−32.95°	Colorless
II	75–76	163	70	0.8633	1.4744	−34.75	Colorless
III	76–82	163–165	324	0.8625	1.4771	−29.37	Colorless
IV	82–100	165–177	176	0.8720	1.4824	−15.28	Colorless

Levo Alpha Pinene.—A portion of the first fraction was oxidized to pinonic acid by means of an 8 per cent aqueous solution of potassium permanganate. The semicarbazone of the acid was prepared and, after washing with dilute alcohol, melted at 201° C. There was no depression of the melting point when the crystals were mixed with the semicarbazone of pinonic acid prepared from oil of turpentine. The inability of Sweet (1) to detect the presence of alpha pinene in the leaf oil may have been due to the fact that reliance was placed entirely upon the nitrosochloride test alone, which has since been found to be unsatisfactory when applied to oils possessing such a high rotatory power. The writer was likewise unable to prepare the nitrosochloride.

Levo Camphene.—Fraction II was hydrated according to the method of Bertram and Walbaum (8). Not all of the oil responded to this treatment and hence it was found advisable to discard that portion which was not hydrated and which formed a separate layer. The hydrated oil was saponified with alcoholic potassium hydroxide and as a result isoborneol was obtained which when purified by recrystallization from petroleum ether melted at 204° C. The phenylurethane after purification melted at 136° C. The melting point of the crystals therefore together with that of the phenylurethane served to identify isoborneol, the hydration product of camphene.

Levo Beta Pinene.—The third fraction yielded large amounts of nopinic acid when oxidized with an alkaline solution of potassium permanganate using Wallach's method (9). The crystals melted at 126–127° C. after purification by recrystallization from ether. The preparation and identification of a relatively large amount of nopinic acid indicated that the fraction consisted chiefly of beta pinene.

Dipentene.—A portion of Fraction IV was dissolved in glacial acetic acid and brominated according to Wallach's method (10). The solid derivative when crystallized from ethyl acetate melted at 114° C. By repeated recrystallization from the same solvent the melting point was raised to 119° C. which is somewhat lower than that given for dipentene tetrabromide. In order

to confirm the presence of dipentene the dihydrochloride derivative was prepared which when purified melted at 50° C. Because of the large yield of derivatives it was assumed that the fraction consisted mainly if not entirely of dipentene.

Saponification of the Higher Boiling Portion.—That portion of the oil which boiled above 100° C. at 25-mm. pressure and totaled 190 cc., and represented approximately 19 per cent of the original oil, was saponified with alcoholic potassium hydroxide. After saponification the oil was separated, washed, dried and submitted to repeated fractionation at 16-mm. pressure. The following fractions were obtained:

Fraction No.	Boiling Point, 16 Mm.	Amount.	Sp. Gr., 20° C.	N_D^{20}.	$[\alpha]_D^{26}$.	Color.
I	100–140° C.	114 cc.	0.909	1.4841	−13.55°	Yellowish
II	140–165	4	0.891	1.5095	0.0	Brownish
III	165–190	5	0.858	1.5133	0.0	Bluish green
IV	190–above	4	....	....	....	Tarry residue

Geraniol.—The first and largest fraction which distilled between 100° and 130° C., was separated into several portions the greatest amount of which boiled between 125° and 130° C. It was this latter portion that gave the most satisfactory derivative of geraniol. The diphenylurethane was prepared by treating the fraction with diphenyl carbamine chloride in pyridine according to the method of Erdmann and Huth (11). The purified crystals melted sharply at 82° C. The preparation of the derivative, geraniol diphenylurethane, established the presence of the alcohol geraniol.

Azulenogenic Sesquiterpene.—Although the third fraction because of its bluish green color was suspected of containing azulene, no positive results could be obtained, probably due to the fact that if azulene were present it was only in a very small amount. When a chloroformic solution of bromine was added to a small amount of the fraction, as outlined by S. and H. Sabetay (12), a bluish green color was obtained which was indicative of an azulenogenic sesquiterpene.

No constituents could be identified in Fraction II, while Fraction IV which possessed a slightly burnt odor indicating partial decomposition was not examined.

Combined Acids: Capric Acid.—The alkaline liquid from the saponification was concentrated, acidified with dilute sulfuric acid and distilled with steam. The distillate consisted of a soluble and an insoluble portion. The insoluble layer which floated on the surface of the distillate measured 2 cc. and from it was prepared the silver salt in the usual manner. Analysis of the samples of silver salt showed them to contain 38.2 and 38.8 per cent, respectively, of silver. The silver salt of capric acid contains 38.66 per cent of silver, hence the results here obtained indicated that the insoluble combined acid was capric acid.

Acetic Acid.—Acetic acid was identified as being present in the aqueous portion of the distillate by the usual general qualitative tests.

SUMMARY.

The fresh leaves and twigs yielded 0.8 per cent of oil which consisted of 75 per cent of terpenes and 19 per cent of higher boiling constituents including an alcohol and sesquiterpenes. The composition of the oil was found to be about: 12 per cent levo alpha pinene; 7 per cent levo camphene; 33 per cent levo beta pinene; 18 per cent dipentene; 12 per cent geraniol partly as the caprate or acetate; capric acid was present in both the free and combined state, while acetic acid was found in the combined state only. The phenols, which amounted to 0.07 per cent consisted chiefly if not entirely of salicylic acid.

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THE ASSAY OF CYSTEINE HYDROCHLORIDE.*

BY C. F. BICKFORD AND R. E. SCHOETZOW.

The assay of cysteine has been discussed by Okuda (1) and by Lucas and King (2). Their methods involve the use of aqueous solutions and require exact control of acidity, iodine concentration and temperature. Moreover, the factors used to calculate cysteine are more or less empirical; such factors are not as desirable to use in quantitative analysis as stoichiometrical ones derived directly from chemical equations. We have succeeded in avoiding their use.

In an aqueous acid solution, cysteine can react in more than one way. If we indicate the cysteine molecule as R.S.H., the reactions can be expressed by the equations which follow:

I.		$2R.S.H. + I_2$	=	$2HI + R—S—S—R$
II.	(*a*)	$R.S.H. + H_2O + I_2$	=	$R.S.OH + 2HI$
	(*b*)	$R.S.H. + 2H_2O + 2I_2$	=	$R.SO_2H + 4HI$
	(*c*)	$R.S.H. + 3H_2O + 3I_2$	=	$R.SO_3H + 6HI$

The oxidation of cysteine with iodine in aqueous acid solution proceeds in accordance with II as well as I. The equations under II require water as a reactant, while the equation under I does not.

We have found that the oxidation of cysteine proceeds substantially according to Equation I when carried out in such a manner that at the end of the titration the solvent medium consists of ethyl alcohol containing not more than 20% water by volume. The use of alcohol as a titrating medium and of $N/10$ aqueous iodine as oxidant permits a rapid and practically quantitative estimation of cysteine in cysteine hydrochloride monohydrate. It avoids the undesirable use of empirical factors and at the same time simplifies the determination. Another advantage in the use of alcohol as solvent is that the cysteine formed, or its salt (hydrochloride or hydroiodide) separates from the reaction mixture as a white crystalline precipitate, thus favoring the reaction in the sense given, *i. e.*, a reactant is removed from the reaction phase.

Table I gives the results obtained by the Okuda (1) method using the stoichiometrical factor derived from Equation I and an empirical factor derived from Okuda's discussion.

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TABLE I.—PURE CYSTEINE HYDROCHLORIDE MONOHYDRATE CONTAINS THEORETICALLY 68.98% CYSTEINE BASE.

	Cysteine Hydrochloride Hydrate, Grams, Sample Taken.	Potassium Iodate, Cc. $M/300$.	% Cysteine Base. By Stoichiometrical* Factor.	By Empirical[1] Factor.
(*a*)	0.0942	35.08	90.22	71.61
(*b*)	0.0818	31.15	92.26	73.23
(*c*)	0.0539	20.65	92.82	73.68
(*d*)	0.0703	25.50	87.88	69.76
(*e*)	0.0947	35.30	90.31	71.68

* Factor = 4.127 cc. $M/300$ potassium iodate = 0.01 Gm. cysteine.

[1] Factor = 5.2 cc. $M/300$ potassium iodate = 0.01 Gm. cysteine.

Although absolute accuracy is not claimed for our method, it enables the determination to be made rapidly and the results are superior to those obtained in aqueous acid solution.

The following are the directions for the assay:

A 0.2–0.3 Gm. sample is placed in a 250-cc. glass-stoppered Erlenmeyer flask; 100 cc. of absolute ethyl alcohol are added, the flask stoppered and the flask with contents allowed to stand about thirty minutes. The alcohol solution is then titrated with accurately standardized aqueous 0.1 normal iodine until the yellow color produced by one drop of iodine solution persists for thirty seconds upon vigorous shaking; 0.05 cc. is subtracted as a correction for the excess drop added to produce the yellow color, and the percentage of cysteine calculated on basis of Equation I above.

TABLE II.

$$2HSCH_2.\underset{\underset{NH_2.HCl}{|}}{CH}.CO_2H.H_2O + I_2 = (-SCH_2.\underset{\underset{NH_2.HCl}{|}}{CH}.CO_2H)_2 + 2HI + 2H_2O.$$

Remarks.	Weight of Sample.	Volume Iodine Solution.	Cysteine Hydrochloride Anhydrous.	Volatile Plus Anhydrous Cysteine Hydrochloride.
A. Hydrate No. 1 (9.94% water*) titrated	0.2275 Gm.	12.44 cc.	89.50%	
with aqueous iodine (1 cc. = 0.016367	0.4469	24.33	89.10	
Gm. anhydrous cysteine hydrochloride)			Average 89.3	99.24% (89.3 + 9.94)
No. 1 dried, titrated with aqueous	0.1181	7.09	98.26	
iodine (1 cc. = 0.016367 Gm. anhydrous cysteine hydrochloride)	0.2116	12.91	99.86	
			Average 99.06	
Hydrate No. 2 (9.20% water*) titrated	0.2489	12.48	90.40	
with aqueous iodine (1 cc. = 0.018030	0.3404	17.11	90.63	
Gm. anhydrous cysteine hydrochloride)	0.3079	15.59	91.29	
			Average 90.79	99.99% (90.79+9.20)
B. Titration of hydrate in 100 cc. 95%	0.2917	27.43 (end-point in alcohol)	85.59	
alcohol using iodine in alcohol (1 cc. = 0.009102 Gm. anhydrous		28.60 (end-point in water)	89.24	
cysteine hydrochloride). At end-point, adding 10 cc. water and continuing titration	0.4919	45.92 (end-point in alcohol)	84.97	
		48.13 (end-point in water)	89.06	
C. Mixture of dried cysteine hydrochloride and dried sodium borate[1]				
Preparation No. 1—titrated with	0.4289	13.02	54.92	
aqueous iodine (1 cc. = 0.018093	0.3758	11.41	54.93	
Gm. of anhydrous cysteine hydrochloride)	0.4164	12.72	55.21	

Preparation No. 2—titrated with aqueous iodine (1 cc. = 0.026968 Gm. of anhydrous cysteine hydrochloride)	0.7590	15.95	56.67
	0.7702	16.11	56.41
	0.7603	16.01	56.79
	0.7695	16.17	56.66
D. Sample consisting largely of cystine hydrochloride titrated with iodine (1 cc. = 0.02703 Gm. anhydrous cysteine hydrochloride)	0.4114	2.32	15.24
	0.4190	2.31	14.90
	0.3900	2.23	15.46

* Loss over phosphorous pentoxide in vacuum; theory for monohydrate is 10.26% water.

[1] This mixture is made so that when dissolved in water the p_H will be 3.8–4.0. The amounts of dried materials vary slightly from batch to batch. The mixture usually contains about 58% of dried cysteine hydrochloride.

All of the data have been combined in Table II. Under "A" are given data from analyses on samples of pure cysteine hydrochloride both before drying and after drying over phosphorous pentoxide. Since cysteine hydrochloride monohydrate does not, according to our findings, have its full amount of water (theory 10.26%), use of the factor corresponding to the monohydrate yields values greater than 100%. Therefore, in assaying the hydrate it is best to calculate the titration in terms of anhydrous cysteine hydrochloride and add the value found for total volatile as determined by drying in vacuum over phosphorous pentoxide. This procedure results in values approximating 100% for pure samples of hydrated cysteine hydrochloride.

It has been stated above that the titration is conducted in alcohol so that at the end-point the solvent contains 20% water. When 95% alcohol was used, both to dissolve the sample and to make up the standard iodine solution, the reaction appeared to go rapidly and smoothly during the first part of the titration. However toward the end, the reaction became very sluggish, and a sharp end-point could not be obtained. The addition of 10 cc. water at the end of the titration resulted in a sharp end-point and then speeded up the reaction considerably. The alcohol end-points, which were quite uncertain because of reaction slowness, indicate a value of 95%, whereas those obtained after adding water indicate a value of 99%. The latter value is the more probable. These results show that aqueous iodine solution is superior to alcoholic iodine solution for this titration—see Section B in Table II.

Part "C" of Table II contains results obtained in assaying a mixture of cysteine hydrochloride and sodium borate. The assay method appeared satisfactory since consistent values were obtained.

Either due to incomplete reduction of cysteine or to partial oxidation of the cysteine the sample might occasionally be a mixture of cysteine and cystine. Assays on such a sample are reported under "D." In this case the material does not dissolve completely in alcohol. The quantity of cysteine hydrochloride could be readily found by the titration with iodine.

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STUDIES UPON PRECIPITATION IN FLUIDEXTRACT OF SENNA. II.*

The Effects of Various Physical and Chemical Factors upon Precipitation in Fluidextract of Senna.[1]

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In our previous paper we reported a comparative study of precipitation in all of the official fluidextracts of senna and other formulas. Some were slower to precipitate than others but after a period of several months all of them appeared to have about the same amounts of sediment.

This paper is one of a series of brief accounts of devious attempts to find some means of controlling the apparently inevitable precipitation in fluidextract of senna. The results which were obtained, though not often conclusive, frequently pointed the way for future study.

THE EFFECTS OF TIME, LIGHT AND OTHER FACTORS.

A sample of fluidextract of senna was divided into sixteen four-ounce portions, and treated as indicated in Table III. These were examined at intervals for precipitation. The amount of precipitate observed has been recorded by the same system of plus signs as used in our previous paper. The storage of these samples was at room temperature except when otherwise indicated.

TABLE III.

No.	Treatment.	Container as to Color.	Storage as to Light.	Amounts of Precipitates at Age Indicated in Days by Column. 31.	64.	95.	267.	488
1	Decanted only	Amber	Dark	−	+	+	++++	+++++
2	Decanted only	Clear	Dark	−	+	++	+++	++++
3	Decanted only	Amber	Diffused light	−	++	++	+++	++++
4	Decanted only	Clear	Diffused light	+	++	++	+++	++++
5	Decanted and filtered	Amber	Dark	−	+	++	+++	++++
6	Decanted and filtered	Clear	Dark	−	++	++	+++	++++
7	Decanted and filtered	Amber	Diffused light	+	+	++	+++	+++++
8	Decanted and filtered	Clear	Diffused light	+	+	++	+++	++++
9	Decanted and centrifuged[1]	Amber	Dark	−	+	+	++	++++
10	Decanted and centrifuged	Clear	Dark	−	+	+	++	++++
11	Decanted and centrifuged	Amber	Diffused light	−	+	+	++	++++
12	Decanted and centrifuged	Clear	Diffused light	+	+	+	++	++++
13	Decanted and filtered[2]	Amber	Dark	++++	+++++	41 days[2]		
14	Decanted and filtered[2]	Clear	Dark	++++	+++++			
15	Decanted and filtered[4]	Amber	Diffused light	+	++	+++	++++	105 days
16	Decanted and filtered[4]	Clear	Diffused light	+	++	+++	++++	

[1] Centrifuged for 5 minutes at 1400 r. p. m., the sample deposited 0.15 to 0.20 cc. of sludgy sediment for each 25 cc. of the fluidextract.

[2] Due to an unusually large amount of material that had deposited, numbers 13 and 14 were filtered at the end of two months. [3] Stored at 1–3° C. [4] Stored at 30° C.

* Scientific Section, A. Ph. A., Dallas meeting, 1936. See page 124, February JOURNAL, for Part I.

[1] Based upon a thesis submitted to the Faculty of Purdue University by Karl L. Kaufman, in partial fulfilment of the requirements for the degree of Doctor of Philosophy.

[2] J. K. Lilly Fellow, Purdue University, School of Pharmacy, 1933–1936.

[3] Professor of Pharmacy, School of Pharmacy, Purdue University.

From this study, we have come to the following conclusions:

1. Precipitation in fluidextract of senna is unaffected by the color of the container.
2. Filtering the fluidextract does not affect the rate of precipitation.
3. The fluidextract should be stored at about the same temperature as that at which it was made.
4. Observations upon the precipitation in fluidextract of senna, to be of much value should be continued over a period of not less than three to four months.

ULTRACENTRIFUGATION OF THE FLUIDEXTRACT.

A sample of fluidextract of senna was centrifuged for eight minutes, at 35,000 r. p. m. in a Sharples apparatus. The treatment did not hinder precipitation. Other samples were treated with an alumina cream having an acid reaction. In these samples, stratification of the precipitate was marked.

ULTRAVIOLET LIGHT AND X-RAYS.

Irradiation of fluidextract of senna by means of ultraviolet light and X-rays did not have any marked effect upon the amount of precipitate formed. The irradiation was carried out in stoppered Vitreosil flasks, and the X-ray treatments were made with the samples in clear, soft glass bottles.

After 300 days, the only observable differences between the sediments in the treated and untreated samples was that the X-rayed portions showed a tendency to stratify.

HEAT-TREATMENT OF THE DRUG.

There was the question of enzymes as a possible cause of precipitation in this preparation. To study this, fluidextracts were made from senna which had been previously heated.

Three batches of 750 Gm. each of the drug were heated in an oven at a temperature of 85–100° for 30 minutes. One batch was heated dry. A second was heated after having been moistened with 150 cc. of the official menstruum and a third batch was mixed with magnesium carbonate, 10 Gm. per 750 Gm. of the drug, then moistened with the menstruum and heated.

The fluidextracts made from these three batches exhibited about the same amount of precipitate as the controls after eight months. The one from the magnesium carbonate treatment showed slightly less precipitate and there was a tendency toward stratification in all of those made from the heated drug.

REFRIGERATION.

It was observed that a chilled fluidextract of senna showed an increased amount of precipitate as compared with the control at room temperature. To check this observation more carefully eight samples were refrigerated from one to five days at temperatures ranging from 2° to −20° C.

These samples were filtered and replaced in the refrigerator for further chilling. This was done repeatedly for several days and each time the filtered, chilled samples showed the presence of precipitate. It should be stated, however, that the character of the precipitate was changed. It became increasingly lighter in color and more scaly in appearance. The persistence with which the precipitate continued to reappear in the chilled samples caused us to abandon the treatment as a means of producing a clarified fluidextract of senna.

ALCOHOL CONTENT OF THE MENSTRUUMS.

The effects of varying percentages of alcohol in the menstruum were studied by preparing four fluidextracts with 15%, 25%, 33% and 40% alcohol, respectively, as the menstruums. Our observations upon these fluidextracts are given in Table IV.

TABLE IV.

Sample.	Menstruum.	p_H 23° C.	Amount of Precipitate. 162 Days.	378 Days.
111-a	33% alcohol	5.75	++++	++++
112-a	25% "	5.53	++++	++++
113-a	15% "	5.38	+++	+++++
114-a	40% "	5.65	+++	++++

It will be noted that the p_H is lowest in those fluidextracts made with menstruums of the lower alcoholic content. It is suggested that this may be due to the presence of increased amounts of the water-soluble organic acids as reported by Kubly (1).

ELECTRODIALYSIS.

The presence of inorganic ions in the precipitate from fluidextract of senna suggested a possible cause for the flocculation of the colloidal material which was undoubtedly present.

To test this assumption the fluidextract was subjected to electrodialysis using the Holmes and Elder (2) "moving-film" type of cell. Parchment membranes were used, and the samples dialyzed against the U. S. P. menstruum, to which had been added $^1/_{10}$% borax. The reason for the use of borax will be indicated in a later paper.

The fluidextracts which were dialyzed for about four hours showed about as much precipitate at the end of 166 days as did the control sample.

THE EFFECTS OF VARIOUS CHEMICAL AGENTS.

Strong acids or alkalis, in amounts of 5 to 10 minims per 125 cc. of fluidextract, produced slight increases in the rate of precipitation. They also caused the precipitates to stratify.

Numerous elemental substances failed to reduce precipitation in fluidextract of senna, with the possible exception of lead. Samples treated with magnesium showed gas formation, and assumed the odor of manure and a bromine color.

To 50-cc. samples of fluidextract of senna were added 2.0 Gm. each of nineteen chemical compounds. After about two months, the samples were all filtered and set aside. The reagents and the observations are briefly recorded in Table V.

TABLE V.

Reagent.	Age in Days.	Amount of Precipitate.	Other Observations.
$KClO_3$	66	Heavy	Terebinthinate odor
$KMnO_4$ (0.5 Gm.)	"	"	.....
$Pb(C_2H_3O_2)_2$	"	"	.....
$AgNO_3$	"	.....	Silver mirror
KI	"	Heavy	.....
$Ba(C_2H_3O_2)_2$[1]	216	"	.....
$Na_2B_4O_6.10H_2O$	"	+	.....
CaO (anhydrous)	"	+++	.....
$MgSO_4$	"	++++	.....
$NaHSO_4$	"	++++	.....
$NaAl(SO_4)_2$	"	++++	.....
$NaHCO_3$	"	++++	Marked evolution of gas
H_2SO_3 7%, (5 cc.)	"	++++	.....
$FePO_4$ (soluble)	"	++++	.....
$(COOH)_2$[2]	"	++++	.....
PbO	"	++++	.....
$CuSO_4$ (anhydrous)	"	+++++	.....
$BaCl_2$	"	+++++	.....
HgCl	"	+++++	.....

[1] Treated with dilute sulfuric acid before the first filtering.

[2] Neutralized with NH_4OH before filtering.

SUMMARY AND CONCLUSIONS.

1. The color of the container in no way affects the character and quantity of the precipitate formation in fluidextract of senna.

2. Observations upon precipitation in fluidextract of senna, to be of value, should be continued over a period of not less than three to four months.

3. Filtering the fluidextract does not seem to affect the rate of precipitation.

4. Precipitation in fluidextract of senna is evidently not due to enzyme activity, as shown by,

(*a*) Heat-treating the drug.

(*b*) The effects of most of the chemical reagents.

5. Fluidextracts of senna with decreasing percentages of alcohol in the menstruums tend to show comparable decreases in p_H, over a certain range.

6. Of the chemical compounds tried, borax was the only one which materially reduced the amount of the precipitate which forms in fluidextract of senna.

7. Fluidextract of senna seemed to show reducing properties.

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CHRYSOPSIS GRAMINIFOLIA, NUTT.—A PRELIMINARY STUDY.*,1,2

BY H. DALE ROTH AND HENRY M. BURLAGE.

The genus *Chrysopsis* of the *Compositæ* consists of biennial or perennial caulescent herbs, usually conspicuously pubescent. The leaves are alternate; blades very narrow or sometimes broad, entire and sessile or somewhat toothed and petioled near the base of the stem. The heads are showy, radiate or rarely discoid, typically in corymbs. The involucres are many flowered with bracts narrow, several series; the inner ones successively longer. The receptacle is pitted. Ray-flowers are several, pistillate and the disk-flowers mostly perfect. Corollas are yellow. Stigmas with linear or subulate appendages; achenes flattened. The pappus is double with the outer series of small scales or bristles; the inner of numerous rough hair-like bristles (1).

Chrysopsis graminifolia, Nutt. has silvery-silky foliage with long closely pressed hairs. The stems are 3–9 dm. tall, corymbosely branched. The leaves are various, the basal with narrowly linear blades 1–4 dm. long, many times longer than the upper. The stem-leaves do not clothe the stem, with linear-lanceolate, linear or linear-subulate blades, the upper erect. The involucres are cylindric, 10–12 mm. high, 5 mm. thick. The bracts are linear-subulate, glabrate or glandular-pubescent on the back. The ray-flowers have narrow ligules, 8–12 mm. long (1). The herb flowers from July to October and is found growing profusely in dry sandy soil from New Jersey and Delaware to Kentucky and southward to Florida. It has been known variously as "Golden Aster," "Blue-grass" and "Fever-grass" and has been stated to be of medicinal value especially as a poultice for sprains (2).

A review of literature revealed that no studies have been made on this plant, and because of its reputed medicinal value and since it grows so profusely in the Carolinas it was decided to make a study of it to ascertain, if possible, any therapeutically active substances.

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* Scientific Section, A. PH. A., Dallas meeting, 1936.

[1] An abstract from a thesis to be submitted in partial fulfilment of the requirements for the degree of Master of Science in Pharmaceutical Chemistry.

[2] Pharmaceutical Laboratories, School of Pharmacy, University of North Carolina, Chapel Hill, North Carolina.

The material used in this investigation was collected in the vicinity of Wiggins in Colleton County, South Carolina. Three collections of the entire herb were made: (1) in the Fall of 1933 just after frost, (2) in July 1934 and (3) in August 1934.

Experimental Part.

A. Moisture and Ash Determination.

The moisture content of the various lots of the entire herb was determined by the Xylene method (3) and was found to be as follows: Lot No. 1, 9.8%; Lot No. 2, 10.6% and Lot No. 3, 10.8%.

The ash determinations were carried out in the usual way with the following results calculated on the dry basis:

Table I.

Lot No. 1, Per Cent.		Lot No. 2, Per Cent.		Lot No. 3, Per Cent.	
A.	B.	A.	B.	A.	B.
Total Ash.					
6.96	6.59	8.15	8.33	6.26	6.51
Acid-Insoluble Ash.					
3.85	3.56	4.65	4.63	0.78	0.67

B. Extraction with Selective Solvents.

A portion of each lot of the herb was subjected to continuous extraction in a Palkin-Watkins' apparatus (4) until completely exhausted successively by petroleum ether, absolute ether, absolute alcohol and hot water. In the case of the petroleum-ether and ether extracts the excess solvent was evaporated to a small volume and the remainder was allowed to evaporate spontaneously; the alcohol and water extracts were concentrated to a small volume under a vacuum and the remainder of the solvent allowed to evaporate spontaneously. Since previous tests showed the absence of volatile materials the final extracts were dried to constant weight at 105° C. The results of these extractions on the dry basis are shown in the following table.

Table II.

Extract Appearance of Extract. Lot No.	Petroleum Ether. Yellow Green.	Absolute Ether. Green.	Absolute Alcohol. Green.	Hot Water. Black Brown.
1	1.55%	1.36%	1.11%	7.29%
2	1.57%	0.69%[1]	1.38%	9.03%[2]
3	3.50%	2.29%[3]	1.47%	20.87%

[1] Irritating acetic-like odor.
[2] Sweet licorice-like odor.
[3] Irritating odor.

C. Preliminary Tests.

(1) The usual elemental tests indicated the *presence of Nitrogen and Phosphorus.*

(2) Aqueous extracts of the entire herb of all lots were subjected to the following tests:

(*a*) Reaction to indicators was neutral.

(*b*) Ferric chloride solution gave a blue-green precipitate with all lots indicating, at least, *tannins.*

(*c*) Lead acetate solution produced a precipitate with a colorless filtrate which gave a slight precipitate with basic lead acetate solution indicating a number of substances including tannins, saponins, acids, etc.

(*d*) Fehling's and Benedict's solutions showed signs of reduction; upon acid hydrolysis showed increased reduction.

Purified residues from the Stas-Otto process (5) gave positive tests with (*a*) an alcoholic solution of alpha-naphthol (20%) and concentrated sulfuric acid (blue ring and colored solution on mixing) and (*b*) an alcoholic solution of thymol (20%) (red color) (*c*) showed reduction with Fehling's and Benedict's solution before and after acid hydrolysis. These reactions indicate the presence of carbohydrates, glucosides or disaccharides.

(*e*) Purified extracts from the Stas-Otto process, as well as the aqueous extracts, when tested with alkaloidal reagents, showed the absence of these substances.

(*f*) The usual tests for cyanogenetic substances with picrate paper showed them to be absent.

(3) Bourquelot's method (6) whereby glucosides hydrolyzable by enzymes can be detected in the presence of carbohydrates such as sucrose, which is hydrolyzed by saccharase, indicated that these substances were absent.

(4) Since saponins are indicated and these are glucosidal in character it was thought that these might be responsible for certain positive tests obtained for glucosides. Kraft's procedure (7) which admits the separation of saponin-like substances from the glucosides was employed. Tests after the separation indicated their absence.

Saponins.—Saponins were isolated by extracting the herb with hot 95% alcohol for two hours under a reflux on a water-bath. On concentrating and cooling the hot filtrate a flocculent precipitate settled out, was filtered off and more saponin obtained by the addition of ether to the alcoholic solution. The precipitate was dissolved in water and purified by the Magnesia method (6). After purification and redissolving in alcohol the saponin was precipitated by fractional precipitation with ether and the amount obtained gravimetrically yielding 0.37% on the dry basis. The purified material gave a positive Sagel Test (8).

Tannins.—Tannins were examined further according to the scheme of Dafert and Fleischer (9) and these tests including that of Stiasny (10) indicated the presence of *catechol* tannins with small amounts of *pyrogallol* tannins. Since the two major groups of tannins were shown to be present these were extracted by the method of Chapman (11) and were determined (*a*) by the Cinchonine Sulfate Method of Hooper (12) which is stated to estimate the amount of pyrogallol tannins in the presence of others. This determination yielded 0.60% of pyrogallol tannins and (*b*) the Hide Powder Method of Shröder (6) which gives an estimation of the total tannins present. This content was found to be 3.95%. These results show a probable catechol tannin content of 3.35%. Other extracts which have been obtained and will be studied further also indicated the presence of a *bitter principle*.

SUMMARY.

A preliminary examination of *Chrysopsis graminifolia* is reported which included:

(1) Moisture content varying from 9.8–10.8% for three lots of the entire herb collected at various seasons of the year.

(2) Total ash varying from 6.26% to 8.33%; acid-insoluble ash 0.67 to 4.65%.

(3) Extracts with selective solvents using the Palkin-Watkins' Extractor are determined.

(4) Preliminary tests show the presence of nitrogen, phosphorus, saponins and reducing substances, tannins and bitter principle.

(5) Quantitative determinations show (*a*) saponins 0.36% and (*b*) catechol tannins 3.35% and pyrogallol tannins 0.60%.

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THE SYNTHESIS OF UREIDES OF CERTAIN MONOBASIC ACIDS AND KETONES.*

BY CLIFTON E. MILLER[1] AND RUSSELL A. CAIN.[2]

It is well known that certain ureides prepared from dibasic acids possess marked hypnotic action. In view of this fact it seemed of interest to prepare ureides from brominated aliphatic monobasic acids and ketones with a view to studying their physiological action.

The compounds prepared were: α-bromo-*n*-caproyl ureide, α-bromo-iso-caproyl ureide, methyl-β-β-dimethyl-2-urea α-α-dibromo ethyl ketone and β-β-dimethyl-2-urea-α-α-dibromo ethyl-iso-propyl ketone.

EXPERIMENTAL.

α-Bromo-Caproyl Ureide $C_7H_{13}O_2N_2Br$.—Place a mixture of 56 Gm. of *n*-caproic acid and 3 Gm. of red phosphorus in a 500-cc. round-bottomed flask having a ground glass neck into which is fitted an upright condenser. To the mixture add 71 Gm. of bromine drop by drop and reflux over a water-bath until the contents assume a light yellow color. The brominated acid is separated from the mixture by distillation at reduced pressure. A total of 74 Gm. were obtained. The acid was light yellow in color, possessed a faint but persistent odor, insoluble in water, soluble in alcohol, ether and chloroform; boiling point 131° C. at 9 mm.; $d_{23°}$ 0.9404; $n_D^{20°}$ 1.423; $[\alpha]_D^{25°}$ −47.46° in benzene.

To prepare the acyl chloride derivative an excess (10 Gm.) of thionyl chloride is added to the acid (20 Gm.) in a manner similar to that used in the bromination. Remove the sulfur dioxide by heating on the water-bath and separate the prepared acyl chloride derivative by distillation at reduced pressure. The pure compound (21 Gm.) possessed a boiling point of 98° C. at 30-mm. pressure.

The ureide is finally prepared by mixing the brominated acyl chloride (19 Gm.) with urea (18 Gm.) and slightly warmed on a water-bath. The mixture at first liquefies, after which it becomes a solid mass. The mass is neutralized by washing with several portions of aqueous sodium carbonate solution after which it is washed with distilled water.

After several recrystallizations from a hot 50 per cent solution of alcohol the ureide melted at 175° C. It consisted of colorless crystals having a slight but persistent taste, insoluble in water and fixed oils but soluble in 95 per cent alcohol, ether and chloroform.

A nitrogen determination showed the compound to contain 11.07 per cent N as compared to 11.45 per cent calculated on the basis of the formula $C_7H_{13}O_2N_2Br$.

α-Bromo-iso-Caproyl Ureide $C_7H_{13}O_2N_2Br$.—The method used in preparing the iso compound was essentially the same as that outlined for the normal compound. Starting with 60 Gm.

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of iso-caproic acid and 83 Gm. of bromine a yield of 30 Gm. of the brominated acid was obtained which possessed the following constants: Boiling point 130° C. at 25 mm.; $d_{23°}$ 0.9923; $n_D^{20°}$ 1.4426; $[\alpha]_D^{25°}$ −57.42° in benzene.

The acyl chloride was prepared by treating 25 Gm. of the brominated acid with 12 Gm. of the thionyl chloride as a result of which there was obtained 23 Gm. of the pure product having a boiling point of 83° C. at 20-mm. pressure. The liquid was light yellow in color, very irritating and somewhat unstable in air.

By using 21 Gm. of the brominated acyl chloride and 20 Gm. of urea the crystalline ureide melting at 161° C. was prepared. With the exception of the melting point its general properties were the same as the ureide prepared from the *n*-caproic acid. A nitrogen determination showed the product to contain 11.73 per cent nitrogen, while that calculated from the formula $C_7H_{13}O_2N_2Br$ was 11.45 per cent.

Methyl-β-β-Dimethyl-2-Urea-α-α-Dibromo Ethyl Ketone $C_7H_{12}O_2N_2Br_2$.—Place 240 Gm. of commercial dimethyl-ketone in a Soxhlet extractor in the presence of barium hydroxide and reflux according to the method of Conant and Tuttle (1). Filter and heat on a water-bath to remove any excess ketone remaining and finally separate the diacetone alcohol by distillation at reduced pressure.

The alcohol possessed the following physical constants: Boiling point 81° C. at 25 mm.; $d_{23°}$ 0.8741; $n_D^{25°}$ 1.6560.

In the preparation of the dibromo-substituted product the method of Issotacherko (2) is employed whereby 68 Gm. of bromine are added, from a dropping funnel, to a mixture of 25 Gm. of the hydroxy ketone, 18 Gm. of calcium carbonate and 50 cc. of water. Wash the brominated compound with water and next extract with small portions of ether. Dry the combined ether washings with calcium chloride, filter and allow ether to evaporate spontaneously. Purification by distillation yielded a light yellow, viscous liquid boiling between 49° and 50° C. at 20 mm.

Chlorinate the dibromo-hydroxy-ketone by treating 15 Gm. with 9 Gm. of thionyl chloride. The purified product obtained by distillation at reduced pressure was a light yellow liquid which boiled at 47° C. at 29-mm. pressure.

Warm the dibromo-mono-chlor-ketone (9 Gm.) on a water-bath with 12 Gm. of urea. When complete solution has been effected the mixture is allowed to cool after which it solidifies into a solid mass of crystals. From hot secondary butyl alcohol the solid precipitated in form of colorless needles which melted at 145° C. They possessed a mild characteristic odor and salty taste, soluble in water, physiological saline solution and alcohol, but insoluble in ether and chloroform. Analysis of the compound showed 8.53 per cent nitrogen as compared to 8.37 per cent calculated from the formula $C_7H_{12}O_2N_2Br_2$.

β-β-Dimethyl-2-Urea-α-α-Dibromo-Ethyl-iso-Propyl Ketone $C_9H_{16}O_2N_2Br_2$.—This compound was prepared in the same manner as that outlined for the normal ketone. Starting with 60 Gm. of di-methyl ketone and 74 Gm. of methyl iso-propyl ketone there was obtained 18 Gm. of pure β,β-dimethyl-2-hydroxy-ethyl-iso-propyl ketone. It was light yellow in color of characteristic odor and possessed the following physical constants: boiling point 86° C. at 25 mm.; $d_{23°}$ 0.8727; $n_D^{20°}$ 1.6623.

The mono-chlor substituted ketone was formed from 10 Gm. of the dibromhydroxy ketone and 7 Gm. of thionyl chloride. A total of 9 Gm. of the purified liquid product was obtained. It was light green in color and boiled at 104° C. at 20-mm. pressure.

The ureide was prepared from the mono-chlor derivative and urea. After repeated recrystallization from hot secondary butyl alcohol the crystals melted at 123° C. They were soluble in water and normal salt solution but insoluble in ether and chloroform. Analysis of the compound gave 8.01 per cent nitrogen, whereas the amount calculated from the formula $C_9H_{16}O_2N_2Br_2$ was 8.37 per cent.

A preliminary study of the physiological properties of the compounds made by administering them to white rats, indicated that they possess hypnotic properties. Further detailed studies of their physiological action are being carried on. In addition the following new compounds are being prepared and their physiological action will be studied in detail: α-bromo-secondary butyl acetyl ureide,

α-bromo-tertiary butyl acetyl ureide, α-bromo-di-methyl ethyl acetyl ureide, α-bromo-di-ethyl acetyl ureide, α-bromo-methyl-iso-propyl acetyl ureide.

SUMMARY.

Four aliphatic ureides were prepared and their general properties determined. A preliminary study of their physiological action has indicated that they may be of value as sedatives or hypnotics.

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A NOTE ON THE PRESENCE OF MALE SEX HORMONE IN FISH TESTES.*

BY LLOYD W. HAZLETON AND F. J. GOODRICH.

The earliest knowledge of the comb growth activity of the testes was gained by A. Pezard in 1918 (1). The hormone activity was first extracted from bull testes in 1927 by L. C. McGee (2).

The history and literature is excellently reviewed by C. R. Moore in the *Journal of the American Medical Association* (3). It will be noticed that the active principle has been obtained from the bull, goat and ram testicles and human male urine, but its occurrence outside the mammalian family has not been studied.

With this in mind and in consideration of the fact that the testes of the Silver Salmon are very large and that great numbers of this fish are caught annually, this investigation was undertaken to determine the presence or absence of the hormone and the quantity.

The male salmon were taken during the breeding season from the state fish-traps at Goldbar, Washington. The testes were removed and frozen for storage during a period of one month. The method for extraction of the hormone was essentially that followed by Gallagher and Koch (4); 3100 Gm. of the tissue were ground and extracted with four volumes of 95% alcohol for five days. The alcohol was then expressed from the tissue and removed by distillation at 20-mm. pressure at 25° C. The solution was concentrated to a sludge of about 1500-cc. volume.

The sludge from above was extracted with benzene until all color was removed and evaporation of a benzene sample left no residue.

The benzene was removed by distillation at 40-mm. pressure at 18° C. A semi-solid mass of 125 cc. remained. The benzene was completely removed by a current of dry air, and the residue treated with acetone at −10° C. for 24 hours, then the acetone was filtered and removed by distillation at 70-mm. pressure at 18° C.

The residue so obtained weighed 12.047 Gm. and was assayed on capons by the method of Gallagher and Koch (5). We were, however, unable to obtain leghorn capons such as were used by the authors and used instead the larger barred rock capons. Previous work (6) has shown that heavier breeds of capons are much less reactive to the hormone than are the white or brown leghorn capons which have become standard birds for assay. We therefore regard the growth obtained in our birds as being positive. Although the growth obtained was not as large as would

* Scientific Section, A. PH. A., Dallas meeting, 1936.

have been obtained in the standard birds, it varied with the dosage which was evidently not large enough to produce maximum growth.

A daily dose of 50 mg. in sesame oil for five days produced a total increase in length plus height of 1.7 mm. in the first capon and a daily dose of 100 mg. produced a similar increase of 2.3 mm. in the second bird. A distinct brightening in color was observed in the comb in both cases during the treatment. At the end of seven days the size and color of the combs was normal again. Injection was made deep into the pectoral muscle and no irritation was produced at the site.

Testes of the salmon, therefore, contain a substance similar in physiological action to the male sex hormone. Further work on quantity, identification and purification is now being carried on.

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The American Institute of Pharmacy.—The advancement of Pharmacy.—The youth depicts the progressive step; the senior represents the pioneer, observing the improvements made as fruits of his earlier researches.

The American Institute of Pharmacy.—The woman, symbolic of Hope, leads the invalid toward Light; the lamp on the pedestal symbolizes, in this interpretation, the Knowledge to cure.

PRACTICAL MEDICAL ECONOMICS.*

BY FRANK B. KIRBY.[1]

It is an interesting and significant observation that the economic depression through which we are passing (or which we hope is passing) shows the least losses in the food industry with a close second in pharmaceuticals. The figures then rapidly decrease to include every known industry ending probably in diamonds and real estate.

Such being the case and in view of our extensive educational system with a marked emphasis on hygiene, it would seem that our enormous tonnage of pills and potions, galenicals and ointments should give us a health record to brag about. Our 60,000 drug stores report total sales in 1930 at $1,650,000 of which 40% are pharmaceuticals. But what are the further facts? In contrast to this our draft board work of 1917 brought to light a number of compelling facts, principle of which that one-third of our men between 18 and 31 years were declined for active service for physical reasons.

The Cincinnati Public Health Federation reported that out of a group of 1000 office employees 781 showed physical impairments of significant importance. Seventy-five per cent of them were between 30 and 35 years of age and 361 of the 781 had cardiovascular defects.

Equally important is the disclosure that 728 of the 1000 employees examined had physical impairments of which they knew nothing. It is a startling fact as reported by our statisticians that 38.2% of our people get *no* professional medical care and 79% get *no* dental care. No wonder the draft boards report as above.

Of so simple and so important a matter as vaccination against smallpox it is alarming that only 21 per cent of city children under six have it done and only 7 per cent of rural children. Serious as are these figures the large percentage of unintelligent self-medication employed by those who think they cannot afford professional care or for other reasons, is far more serious.

We are told that our total medicine bill is $715,000,000 of which 70% is for self-medication, meaning home remedies and patent medicines.

There are probably 135,000 physicians in active practice in the United States. We should say in practice not knowing how active they are. This is one of the practical problems of our study in medical economics, especially when you consider that one-third of our physicians enjoy or suffer from an income of less than $2500.00 (1929).

The dental profession reports a large percentage of unused time, though not so large as in the medical profession.

The under employment and unemployment of private duty trained nurses is simply another feature of over-production and faulty distribution.

Hospital facilities present the same irregularity in empty beds *versus* such figures as above as against an enormous number of untreated patients actually needing professional care.

It is reported that our 132,000 trained pharmacists compound on the average of 1200 prescriptions each yearly, whereas a professional pharmacist could fill ten

* Section on Practical Pharmacy and Dispensing, A. PH. A., Dallas meeting, 1936.

[1] North Chicago, Ill.

times that many. They say that with our present equipment our pharmacists could easily fill 1,000,000 more prescriptions a year.

Think of these figures and correlate them with the out-of-work physicians, dentists, pharmacists and nurses. The awful record of those killed in the World War shows 50,285 but against that we report 88,088 deaths from tuberculosis; 119,818 from cancer; 36,000 from auto accidents and 135,848 infants under 1 year. The work is here to be done.

The curriculum in our professional colleges in medicine, pharmacy and dentistry is second to none. We have the knowledge. We have the mental equipment. Also there is a big need for treatment but between the two is a great gulf fixed: and the important problem is how to bridge the gap.

This paper does not aim at solving these problems in a national way but simply to act as a sign board pointing the way. More specifically the thought is to show ways and means by which the individual pharmacist can coöperate as a middle man between your professional clientele and the needy public in your community.

For instance your neighborhood physicians have probably had four years in high school, five years in a medical college and practical experience in a hospital, and with all this, one-third of them average an income of less than $2500.00.

The thought is to encourage an increasing number of pharmacists to make this a personal matter in meeting your community needs—your dentists, physicians, yourself and your public.

Those figures as above given on self-medication will spell one thing to the merchandising druggist and another thing to the professional pharmacist. Is your aim to increase self-medication or decrease it? There is only one answer if you have fully understood the principles of pharmaceutical ethics and that is to aim to decrease self-medication. Back of all of it is ignorance of both pathology and drug action, often coupled with empiricism.

It has been shown that we have the equipment, and time. If we are over-equipped on a basis of the available work, whose fault is it? Whose fault is it, this under treatment or neglected treatment of needy patients and the unemployment of our physicians, dentists, hospitals, nurses and pharmacists?

While finding the answer to the cause of these problems we should give closer attention to a solution of them.

One of our popular magazines (neither medical nor pharmacal) made an intensive survey of existing conditions and found that:

619 patients with colds treated themselves while 242 consulted physicians
528 patients with burns and scalds treated themselves while 55 consulted physicians
518 patients with constipation treated themselves while 77 consulted physicians
537 patients with cuts treated themselves while 56 consulted physicians
262 patients with heartburn treated themselves while 24 consulted physicians
444 patients with sore throat treated themselves while 163 consulted physicians.

This magazine found that:

401 physicians recommended a proprietary magnesia preparation
293 physicians recommended a proprietary aspirin
244 physicians recommended a proprietary hexylresorcinol
152 physicians recommended a proprietary antiseptic solution
76 physicians recommended a proprietary inhalant

27 physicians recommended proprietary cough drops
22 physicians recommended a proprietary chewing laxative
210 physicians recommended a proprietary "rub."

While hundreds of other physicians encouraged self-medication by recommending other proprietaries, one wonders how many of them learned their therapeutics *via* the radio.

The Public Library record on a borrowed book "Medical Care for the American People" showed it had been out 46 times in 25 months or the limit of time allowed for that book, as evidence that the people are interested.

What can we do to sustain this interest as evidence of our knowledge of practical medical economics? The academic listing of the facts is of value only as we use them.

The Chicago Dental Society has a committee on "Industrial Diagnostic Service." This speaker is familiar at first hand with the work of this committee in one industrial group. Of 640 employees only 65 of them needed no dental work. Most of these had just had dental work completed while a very few had a perfect set of 32 teeth. They claim that not three per cent of our people by and large show a complete set of 32 teeth which have neither had nor needed treatment by a dentist.

As a part of the practical application of this diagnostic study, 181 of these employees of the group referred to, had started or finished their dental work within two months. One hundred and eighty-one employees needing dental care were changed from prospects to paying patients.

A dozen medical societies widely separated throughout the country have done like our dental friends just quoted and made the survey that unearthed many a pathological condition needing treatment.

To get down to some practical applications based on the economic study seven effective suggestions are submitted.

In the first place a plan utilizing our knowledge of urinalysis is offered. This subject should not be studied simply to pass a college or board examination. This knowledge costs money and should be made of value. Physicians have the knowledge, too, but by their laws of ethics they cannot tell the sick public in the community and they are therefore limited to their (relatively) few patients. Therefore very few of them do or care to do urinalysis. Urinalysis is submitted as one method of bringing to light some hidden unknown pathology—not much but some. The subject need not be gone into deeply. It will take only a little equipment, little space and a little time to show indican, sugar, albumen and blood. Such work should never be done like prescriptions—while the patient waits. The specimen is put aside and the work done during spare time.

For ten years now your speaker has noted a 10 by 12 sign in a drug store in probably the highest rental property in New York City. It simply says "Urine Analysis $1.00" and year after year he has asked one clerk after another whether that is a joke or a real advertisement, and he is informed that it pays. The writer has passed a gem of a little store, clean as a pin in a very poor section of Philadelphia. It carried a sign "Urine Analysis" on the outside window sill; he has been informed that they average five tests a week or the equivalent of $250.00 per year.

Information gained in this way is never an encouragement to self-medication; therefore the customer should not be alarmed. Do not say sugar, say glucose and

mildly suggest "to see the physician some of these days and have that condition cleared up." Never mention Bright's disease, never say diabetes, but if properly used, that information (paid for by the customer) will go a long way in creating good-will for you on the part of one physician after another.

As a practical good-will builder there is no thing in your store that will prove better or even the equal of this.

A second suggestion is a Baby Clinic. This may be as simple as a baby scale conveniently placed so that mothers and nurses can stop in and do their own weighing. On the other hand it might profit to employ a nurse on a half or whole day a week for other measurements. Even so simple a record as these may unearth some pathology that needs attention.

Next and without going into the matter at length the desirability of an annual schedule of twelve studied professional windows of ten days each is emphasized. *Some* will prove simply interesting. *Some* will create good-will. *Some* should actually sell goods. *All* should sell your store.

Nobody knows how many people are subject to cold in the head. Everybody knows what it is. Nobody has a specific cure. Everybody treats it.

For a piece of team-work with the physicians try this. The use of *M. Catarrhalis* Bacterin is an approved scientific method of treatment. Based on a satisfactory experience of years, some of the industries employ the Bacterin treatment in routine. The regulation three doses, a week apart, give only four to six weeks immunity, meaning three or four series of injections each season.

Any physician can do this work. They all know how but again, their rules of ethics forbid their advertising the fact.

Here is where the window display will go a long way as a practical solution of this phase of medical economics.

Picture the figures as given to us by the statisticians. It has been estimated that we suffer from a financial loss of one hundred million dollars in this country from cold in the head between Christmas and Easter. This indicates a pay-roll loss of at least eight days for 2,000,000 wage earners. A real problem in Medical Economics.

The fourth suggestion is another real piece of service both to the nursing profession and the sick public in the community. There are times when a nurse is needed badly—a real emergency. The drug store should be a center of information along this line. The druggist will be in position to render an appreciated bit of service if he makes and prepares a nurses' directory. Addresses and phone numbers should be included with a column to indicate whether off duty or on duty and therefore not available or available.

Never mind whether the local hospitals and other units have such a directory, the druggists will be equally effective on a service basis to the physicians, their patients and the nurses themselves.

Such a list should be kept up-to-date and up-to-the-minute, meaning coöperation with the nurses themselves so they will not be called for service when engaged with a patient.

Suggestion number five has to do with Hay Fever. It is estimated that there are some 2,000,000 such patients every year with symptoms recurring on a time table regularity. In the Great Lakes Goitre belt those patients expect evidence of their

first symptoms on August 15th. This means a systematic program if a pharmacist is to render the maximum of service to his community.

Window displays should be scheduled for the simple skin test for all who suspect hay fever so that with a positive diagnosis the regulation pollen protein treatment can be started in time.

Distinguish between the preventive treatment for patients known to have hay fever and the remedial treatment of those who never had it and who wake up August 15th with enough symptoms to make sure of the diagnosis. The pollen treatment given before August 15th is preventive. The nasal douches, nasal sprays and vitamin treatment are for use after August 15th.

These observations will readily enable druggists to organize their windows to do for their physicians and the sick public what they cannot possibly do for themselves. To the best of the writer's knowledge there is no other ethical method by which to bring to the attention of the hay fever patients in their respective communities the ability of the physicians to successfully treat them.

In closing only two more suggestions are offered. The first is with reference to the frequently suggested and often neglected physical examinations. The figures and references at the beginning of the paper emphasize the importance of the matter. The difficulty is the insufficient "drive back" of the thought to see that the examination is made. Nobody is responsible, so it is neglected. Here again physicians have the ability, equipment and time which hangs heavy on their hands—unproductive time that should be made to pay.

The listing of physicians should be considered who will do this work. The list should be exposed in large type as a window display, center piece surrounded by borrowed equipment. The druggist and clerks should read up on the work to answer questions surely to be raised and the result will be an increasing amount of professional good-will worth a lot to the druggist.

It is not easy to believe, but it is said that 79 per cent of our people get no dental care. These statisticians cannot estimate the amount of pathology resulting from this neglect, but a partial picture may be had of the illness of various types resulting therefrom.

Anything that the pharmacist can do to center attention on the need for systematic dental care with regularity will contribute just so much to solving the problems of medical economics.

Over the counter suggestions are in order. A small circular in every package of every dental product sold—brushes, pastes and powders calling attention to the value of dental work will help a lot.

"See your dentist twice a year
Buy your dental products here."

While there is a similarity of needs in California and Maine the specific problem that affects the druggist's bank balance is a community affair, no matter how it may be nationally scattered.

Finally, these suggested answers to the problems of medical economics have nothing to do with committee action of the drug associations and clubs. They are a personal matter to be accepted or rejected by the individual pharmacist, as personal as his bank account and just as vital to his continued growth and stay in business.

VERBENA, THE HOLY HERB OF THE ROMANS.*,[1]

BY C. J. ZUFALL AND B. B. KNOLL.

Throughout our pasture lands and in level, wet places grows verbena, the holy herb of the Romans. The observer sees a rather broad-leafed plant averaging two and a half feet in height and topped by a spike of brilliant blue flowers. The taste of the leaves is bitter, and the stock pass warily by the warning blue spike. Human beings give it little notice except to comment on the color or, if well-informed, to apply it in cases of ivy poisoning. The plant may be used as an emetic, but there is slight demand for it as such.

This, then, is the unimpressive appearance of a plant which has been intimately connected with mythology, medicine, superstition, merriment and magic, and has been made an exception in Roman law. This plant which grows in our own temperate climate flourished in the mansion grounds and pastures of old Rome.

When a Roman wished to seek a parley it was the custom to pluck any plant from the environs of his house and carry it as an indication of his wish. The olive branch has been carried as a sign of peace. To-day we wave the white flag for surrender. The Roman carried his plant as a sign that he wished to come to terms. Gradually the particular plant now called verbena, Latin for *holy herb*, came to be used on such occasions. During times of battle, verbena was the protection of those wishing negotiations. In time the carrying of the symbol became the specific duty of one man who was given the name of *verbenarius*. Livius, in his "Histoire Romaine," also gives the name *fecial* to the verbena carrier. The fecial wore the plant as a wreath on his head and also wove it into his hair. However, carried or worn, the verbena was considered ennobling to the bearer. The act performed by the verbenarius or fecial was highly honorable. What wonder, then, if the elevated position gained by association in this act began to lead toward other uses for verbena? Through custom it was regarded as a sign of protection and of honor. Was it a far step from this to the position of good luck omen? And thence to medicine, a charm against disease? From this beginning the enhanced properties of verbena accumulated rapidly. It was a powerful magic, an aid in prayer and expiation. It brought many and various gifts to the user. It was used in rites of the rulers and in public ceremonies. Rules and rituals were built about commerce with it. In all Rome there was no plant which enjoyed such renown as the blue-spiked verbena—the holy herb.

The table of Jupiter was cleansed with verbena. With it houses were purified, and expiation was made. Strangely enough, after such worshipful uses, water in which verbena had been steeped was sprinkled on the banquet table to promote merriment and hilarity. The people employed the holy herb for soothsaying and prediction of future events. If they rubbed themselves with it they were sure to gain the object of their desires. With it they could ward off fever, conciliate friendship or cure numerous diseases. There was almost no limit to the usefulness of this potent spell-maker.

The power could be preserved only by proper care, the gatherer believed. Verbena must be plucked approximately at the rising of the Dog Star. The sun

* Section on Historical Pharmacy, A. PH. A., Dallas meeting, 1936.

[1] Purdue University, La Fayette, Ind.

or moon must not shine upon it, and honey-comb and honey must first be presented to the earth by way of expiation.

At one time in Rome there was a law against selling public remedies, but, because of the use of verbena in public rites, it was exempt.

Pliny throws a historical light upon the plant. "Verbena," he states, "was thought to be one of the plants taken into the ark and therefore must be returned by raiders of a town."

Virgil, in Eclogue 8, pays tribute by putting these words into the mouth of a lover:

"The strongest frankincense, rich vervain, burn
That mighty magic may to madness turn
My perjured love."

Thus, the holy herb. After having been reverenced by the mighty and sought by the many, after a conquest colorful and vast, it blooms again, untouched in the flatlands, scarcely known and little sought. This highest holy and powerful magic has dwindled once more into a broad-leafed plant, topped by bright blue spikes and growing in any meadow it chances to find.

FIFTY AND FIFTY.

Following a complimentary banquet to Theodore Metcalf, Boston, March 29, 1887, celebrating the fiftieth anniversary of his entering Pharmacy, an invitation was extended to the company inviting the members to celebrate Mr. Metcalf's Centennial in 1937. He joined the AMERICAN PHARMACEUTICAL ASSOCIATION in 1857 and is no longer with us. On that occasion, among others who were prominent in their day, was Dr. Oliver Wendell Holmes, and reference is made to the occasion, partly because of his interesting remarks. He said, "I hung out my sign under the room directly over his shop, and there I was as ready to receive the smallest fevers as he was the smallest fees."

"There was never a more convenient and happy arrangement than that which brought us together. I wrote my prescriptions upstairs; the patient went down and they were filled downstairs. We could not always be fortunate. We deserved success, but we could not always command it. The excellent Martin Smith, the well-known sexton of the churchyard opposite, was always at hand to finish the work upon which we had entered."

Dr. Holmes spoke of the earlier Boston apothecaries, but quoting this would make a long story. Dr. Holmes said that he always had a great opinion of the medical advice of apothecaries, so when he himself was suffering from slight bodily inconveniences, instead of going to his professional brother, he quietly crept into the back room and asked Mr. Metcalf for advice. He concluded his remarks by drinking a toast to the health of his brother, Dr. Metcalf.

Mellon Institute.

The Library Reading Room.

THE DEPARTMENT OF THE AMERICAN ASSOCIATION OF COLLEGES OF PHARMACY

The Publication Board

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Hereafter this Department will be edited by the Editor of the *American Journal of Pharmaceutical Education*, under the direction of the Publication Board of the American Association of Colleges of Pharmacy. Only such articles will be published which are believed to be of general interest to the pharmaceutically reading public.

SOME OF THE CURRENT PROBLEMS OF PHARMACY.

ERNEST LITTLE.

Pharmacy, like every business or profession, has its points of unusual strength as well as its elements of weakness. I believe that a poll of our members might reveal a surprising agreement that one of the weakest links in our pharmacy chain is its organization, or more accurately, its lack of organization.

Three years ago THE AMERICAN INSTITUTE OF PHARMACY was dedicated in Washington, D. C. The objectives of the movement for a headquarters building in our nation's capitol can be briefly stated as follows: (1) To provide a permanent and adequate home for American Pharmacy, (2) To, so far as possible and feasible, bring together in this home those organizations and associations that are interested in promoting pharmacy as a public health profession, (3) To develop additional activities and services, such as a reference library, an historical museum, a research laboratory, and such other services as might be necessary for the continued advancement and promotion of pharmacy.

The first objective has, of course, been splendidly realized. Our headquarters building is a beautiful and useful structure of which we have every reason to be proud.

The second objective, not yet attained, is well expressed in the following statement which was printed in a little booklet issued at the time the building was dedicated: "Pharmacy must keep pace with other professions and maintain its special position in the public health field. To do this it must build up its reputation and prestige and must constantly improve its service. These objectives, so necessary to every branch of pharmacy, can only be obtained through a compact, well-equipped and well-manned organization of all those forces and influences which contribute to its advancement."

The additional services outlined in objective number 3, and many others, have been instituted or accomplished in spite of this handicap; a fact which reflects great credit on the national officers of various pharmaceutical groups who have carried on under very adverse circumstances.

The resolution by Congress which authorized the erection of the building limited its occupancy to those organizations "serving American pharmacy on a non-profit basis." This restriction played a vital part in securing tax exemption. The plan to consolidate in this structure, professional organizations such as the American

Association of Colleges of Pharmacy and National Association of Boards of Pharmacy, which could not afford heavy operating expenses, was stressed as one of the vital reasons for tax exemption. It is important for many reasons that we should strive uninterruptedly for the realization of objective number 2. It will prove helpful if our members will give thought to this proposal, so far as American Association of Colleges of Pharmacy welfare and the contribution which we, as Association workers, may make to the general welfare of pharmacy are concerned.

To many of us it seems quite obvious that the American Association of Colleges of Pharmacy will never realize its greatest usefulness until it has a central location, closely associated with other pharmaceutical activities, and at least one representative giving full-time consideration to its problems and activities. The voluntary system under which our association has operated has proved as satisfactory as it has, due very largely to the sacrificial service of such individuals as Dean Jordan, Professor Cooper, Dean Lyman, and others and due also to the fact that our problems until now were relatively simple, certainly less involved.

The situation which we now face is quite different. We must organize more effectively if we are to adequately meet the problems of the days ahead. When we are strategically located, and organized to carry on a well-planned program, such as the other health professions have already developed, we will experience more outside interest and assistance than we have ever before enjoyed.

Our headquarters' library and museum are already established and are being developed as rapidly as possible. A research laboratory will be established in Washington, probably early in 1938, and can be operated on funds now available. The committee on maintenance is securing additional funds for the library, museum and other activities. A fund, sufficient for three years, has recently been made available to establish the popular journal which will provide wide contact with the pharmacists of the country. It seems highly essential that the American Association of Colleges of Pharmacy should participate in many if not all of these various enterprises. The National Association of Boards of Pharmacy has already voted to move its offices to our headquarters building. It is hoped the change may be made not later than the early part of 1938.

The advantage to the general profession of pharmacy of such a consolidation of forces is readily apparent. It would allow for the careful scrutiny by each group of every proposal for general advancement. Not only would this be a great safeguard but for mutual problems, the final decision would have behind it the combined forces of all groups. This does not mean that all associations would become indiscriminately blended. By preserving the identity of each group, each organization could deal directly with its own particular problems and at the same time be kept acquainted with the activities of the associated groups.

It might be visualized that such an arrangement would provide something in the nature of a cabinet for the general advancement of pharmacy. Such a solid coöperative front could not fail to impress those with whom we work as well as those whom we wish to influence. It would also prove effective in preventing needless overlapping, reduce effort and expense and enable government officials and other interested individuals to easily contact every division of pharmacy.

A considerable number of important activities have been successfully consummated through our Headquarters Building in Washington during recent years. A

few of the more important and basic activities in which pharmaceutical education and registration are directly concerned are listed below.

The transfer of pharmacists from the sub-professional to the professional and scientific classification by the Personnel Classification Board and the Civil Service Commission: The recognition by the Office of Education in Washington, D. C., of the member schools and colleges of the American Association of Colleges of Pharmacy as institutions of higher learning: The commissioning of pharmacists in the Public Health Service: The commissioning of pharmacists in the Army and the improvement of their service in the Navy: The enactment of prerequisite legislation in the various states, an accomplishment which at the end of the present legislative sessions may be nearly 100% complete: The issuance of Leaflet Number 14 by the Office of Education.

The American Association of Colleges of Pharmacy and the National Association of Boards of Pharmacy have of course rendered considerable assistance in carrying out the above-enumerated activities in recent years. However, distance and the prohibitive time necessary for travel or, even for exchange of correspondence, have prevented their full participation. In other words our present organization is decidedly faulty.

While such progress is encouraging, it represents only a beginning toward securing the recognition and opportunity for service that pharmacy should be accorded. For example, the Civil Service Commission plans to improve its classification and to extend them to the field services and desires the coöperation of the various branches of science and the professions in bringing this about. The office of Education has indicated that the guidance leaflets should be revised. If this is done Leaflet Number 14 should be brought up-to-date and greatly improved. These are but some of the pending activities which should be given our immediate attention.

Secretary Kelly's office is constantly besieged with many requests which could be much more effectively handled by a representative of the American Association of Colleges of Pharmacy with an office in the headquarters building.

During the existence of the codes, which we may again have with us in some form (good friend Lyman to the contrary), the Secretary's office received almost daily inquiries about pharmaceutical education and registration as well. His office also receives many requests from pharmacists who desire to transfer either to or from the United States, or who wish to know about certain requirements, most of which involve educational questions.

Last fall the Medical Department of the United States Army asked for the dates on which the various schools and colleges of pharmacy went to the four-year course in pharmacy. This request was naturally referred to the Chairman of the Executive Committee of the American Association of Colleges of Pharmacy by Secretary Kelly. Literally, weeks were required to collect this data and send it to Dr. Kelly who in turn relayed it to the Medical Department of the Army. Information of this sort should be ready on fifteen minutes' notice. A government official, or anyone else, should be able to get official information on any branch of pharmacy without delay. He should be able to consult in Washington an official representative of every branch of pharmacy, collectively if desired, on thirty minutes' notice. What a united front of that sort would do for pharmacy! What it

would do for pharmaceutical education and for the colleges which you and I represent! Real vision is essential for worth-while, sustained progress. A pennywise policy is always unproductive and usually extravagant and costly to all involved.

Inquiries have been received in Washington, through the International Pharmaceutical Federation or the Pan-American Union, asking about the status and progress of pharmaceutical education. A couple of months ago Secretary Kelly corresponded with the Chairman of the Executive Committee of the American Association of Colleges of Pharmacy about a statement from the Pan-American Union to the effect that they would like to undertake a study of the interchange of professional certificates between the American Republics. No one has found time to follow up this proposal as yet, the reason being that twenty-four hours constitute too short a day for the imperfect and decidedly undermanned organization of pharmacy which now exists.

There are, of course, many completely neglected contacts which should be made by us with other educational organizations and groups. We should keep in close contact with the work of the American Council on Education, the Office of Education, the Civil Service Commission and other agencies which have an important relation to pharmaceutical education. These contacts have been almost entirely neglected so far as any initiative on our part is concerned.

Many inquiries are received from persons interested in pharmacy as a career. Usually Leaflet Number 14, with corrections, is sent them. Many of these inquiries should have much more detailed attention than it is now possible to give them-Here is a most important contact, one which could be made to mean much to every college. Can we afford to invest a few additional dollars to insure our own future, as well as to accomplish less selfish achievements in behalf of Pharmacy? Can we afford not to do it? It seems very certain that the American Council on Education will soon need a Washington office. Perhaps it would be possible for this Council and the American Association of Colleges of Pharmacy to occupy the same office and coöperate as to office help. Possibly the same office staff might be able to serve both of these groups, thereby cutting down on expense to both organizations.

Will you please give these suggestions your very serious consideration and be prepared to discuss them in the pages of THIS JOURNAL?

It is quite impossible for us to satisfactorily handle the problems which lie ahead of us with our present lack of organization. Let us effectively organize and not fumble the splendid opportunities which lie before us.

THIS article by Dean Little discusses some problems of vital interest to the American Association of Colleges of Pharmacy. While he touches upon a number of points worthy of study, the trend of thought is directed toward closer cooperation with other pharmaceutical bodies and finally the establishment of a central office in the AMERICAN INSTITUTE OF PHARMACY at Washington with some official in residence who could speak with authority for the American Association of Colleges of Pharmacy.

The Editor is not opposing this movement, but he does feel it his obligation to state that there are two sides to this problem and it was for the purpose of provoking discussion in the July issue of THIS JOURNAL that this editorial was written.

Some of the annoyances Dean Little refers to were due to the lack of knowledge as to where information is obtainable. For example, if Dr. Kelly had inquired of Secretary Cooper for the information he wanted instead of the Chairman of the Executive Committee, he could have had it in less than two hours. Iowa City, in these days of time annihilation, is as close to Washington as is Newark. So far as a central laboratory for research is concerned, I question whether this Association could ever contribute to its support. What we need to do is to develop research in our teaching institutions where it belongs and which are also the source of those trained to do research. One of the most thoughtful men in American pharmacy has recently said—"I am not at all certain that it would be a good thing for us to have an office in Washington. If we are to have a representative in Washington, he must be a high class representative, one to whom we would have to pay a good salary. Unless we employ such a person, we will merely be adding another clerk to the office force of the Headquarters Building." One thing the Editor is sure of and that is, until American pharmacy is organized along more democratic lines than it is now, we must do nothing that will hinder us in any way of speaking our minds as to what is right and wrong in all the problems that confront pharmaceutical education and legislation.

It is hoped Dean Little's article will provoke a large amount of wholesome discussion before the New York meeting of the American Association of Colleges of Pharmacy.

RUFUS A. LYMAN, *Editor.*

The Pharmaceutical Display at Dallas Pan-American Exhibition.

PROCEEDINGS OF THE LOCAL BRANCHES

"All papers presented to the Association and Branches shall become the property of the Association with the understanding that they are not to be published in any other publication prior to their publication in those of the Association, except with the consent of the Council." —Part of Chapter VI, Article VI of the By-Laws.

ARTICLE III of Chapter VII reads: "The objects and aims of local branches of this Association shall be the same as set forth in ARTICLE I of the Constitution of this body, *and the acts of local branches shall in no way commit or bind this Association, and can only serve as recommendations to it.* And no local branch shall enact any article of Constitution or By-Law to conflict with the Constitution or By-Laws of this Association."

ARTICLE IV of Chapter VII reads: "Each local branch having not less than 50 dues-paid members of the Association, holding not less than six meetings annually with an attendance of not less than 9 members at each meeting, and the proceedings of which shall have been submitted to the JOURNAL for publication, may elect one representative to the House of Delegates."

Reports of the meeting of the Local Branches shall be mailed to the Editor on the day following the meeting, if possible. Minutes should be typewritten with wide spaces between the lines. Care should be taken to give proper names correctly and manuscript should be signed by the reporter. *Please advise us of changes in Roster and mail reports promptly.*

CHICAGO.

The last meeting of the Chicago Branch of the AMERICAN PHARMACEUTICAL ASSOCIATION for the school year of 1936–1937 was held Thursday evening, April 22nd, at the University of Illinois, College of Medicine.

The first speaker of the evening was Dr. Samuel Gordon, chemist, and secretary of the Council on Dental Therapeutics, American Dental Association. Dr. Gordon spoke on the subject of "The Dentist and the Pharmacist."

According to Dr. Gordon, the desire to clean up within the profession brought about the formation of the Council on Dental Therapeutics by the American Dental Association. The rank and file of dentists were aware of the exorbitant prices being charged for many of the proprietaries that they were using and of the false claims that were being made for many of the preparations that were being exploited among the dental profession. Even officers of the Association were guilty of such offenses.

The Council on Dental Therapeutics is patterned after the Council on Pharmacy and Chemistry of the American Medical Association, and in many instances, the two groups have worked together for the mutual benefit of both organizations.

Dr. Gordon read the formulas of many preparations that have been analyzed by the Council and the accompanying false claims. Needless to say, they were quite amusing to those present versed in the fundamentals of therapeutics.

The work of the Council has been to publicize known remedial drugs and dental preparations. These are listed in "Accepted Dental Remedies," the dental book published by the American Dental Association that corresponds to the U. S. P. or N. F. This book has made the dentists conscious of the real use and value of drugs used in dentistry.

Pharmacy became aware of the medicine problem in dentistry and began to see that there was a place for pharmacy in the dental profession. Prescription writing is highly recommended to dentists and it is up to pharmacy to lead the way. It was pointed out that two of the largest distributors of chemicals have been advertising in the drug journals for the pharmacist to get more business from the dentist.

Phenol, procaine, zinc oxide, epinephrine, aspirin, formaldehyde, iodine and alcohol were named as some of the commonly used drugs. These are purchased by the dentists from dental supply houses who know very little about drugs and should be handled by the druggists.

The work is being carried on by the Council on Dental Therapeutics; the Dental Schools are taking up the work, the graduating dentists of to-day are better informed, and the work can be greatly accelerated by coöperation from the pharmacist.

Samuel Shkolnik, Instructor in Pharmacy at the University of Illinois, and practicing lawyer, was the second speaker of the evening.

Mr. Shkolnik discussed the pending bills in the Illinois legislature that were of interest to pharmacists.

The Uniform Narcotics Act would be amended to include barbituric acid derivatives. He pointed out that while they should be controlled by law, inclusion under the above act would impose too severe a penalty for violation.

A second bill would prohibit the sale of food in any place of business but a restaurant. This would even prohibit the sale of ice cream in a drug store, and considering the money already invested by druggists to carry on such sales, would be confiscatory.

Another bill would require the sterilization of all eating utensils.

Other bills would impose a tax of one cent on each soft drink sale and five cents on each gallon of ice cream manufactured for resale.

The Junior Robinson-Patman Bill would carry a triple damage clause and would insure each retailer of an equal starting point.

A Chain Store Tax Bill would tax one store twenty-five dollars, with graduations up to forty stores or over, where the tax would be one thousand dollars per store.

Officers of the Branch for the coming year were inducted into office by the retiring president, S. W. Morrison.

H. M. Emig, *president* for the coming year, outlined the policies and plans which he hoped to carry out during his tenure of office. He then adjourned the meeting. There followed many informal discussions.

LAWRENCE TEMPLETON, *Secretary.*

NEW YORK.

The April meeting of the New York Branch of the AMERICAN PHARMACEUTICAL ASSOCIATION was held April 12, 1937 in Columbia University, College of Pharmacy.

About seventy-five members and guests were present. The minutes of the March meeting were read and approved. Treasurer Currens reported a balance of $453.88.

Chairman Lehman, of the Committee on Education and Legislation, reported as follows:

The Tydings-Miller Fair Trade Bill, H. R. 1611 is to come up on the floor of the House any day. In the Senate the same bill, S. 100, is still in the Judiciary Committee, carrying, however, a favorable report by the Sub-committee.

The final passage of the measure may be expected any day, as its adoption is inevitable owing to the fact that thirty or more states have enacted Fair Trade Laws similar to the California Law and our Feld-Crawford Act.

However, pharmacists are asked to write to their Senators and Congressmen to favor this bill, as it will facilitate the workings of Fair Trade in all states having such laws, as it permits enforcement in Interstate Commerce. Thus manufacturers will be permitted to issue contracts and enforce them without having first to register or establish themselves in such states, a rather costly proceeding.

That the law is becoming effective here is heard from all sources, for the prices on goods made by contracting manufacturers are being maintained quite generally.

The effect on the predatory price cutting houses is shown by the page-size advertisements of Macy's in which they announce that they would push their own goods (something which they have always indulged in).

An important bill is also before Congress at this time which provides that all taxes levied by states on sales may also be levied on sales under Interstate Commerce by the state into which the merchandise is shipped, if such state has a sales tax law. It is supposed that this can also be construed to cover regional sales taxes like the one being levied by municipalities in New York State, such as Buffalo and New York, when goods are shipped there from another state, thus minimizing the competition of Mail Order Houses. The bill is the Colmer Bill, H. R. 4214.

On March 15th, eleven Food Chains were cited by the Federal Trade Commission for violation of the Robinson-Patman Law. The violations consist mainly of the chains demanding from one to ten per cent "Brokerage Fees" or "Commissions" from the manufacturers, which are not being paid to the independent stores.

The first contract in this state signed under this law by Tobacco industry is the Pall Mall Cigarette, La Corona and Antonio y Cleopatra Cigars of the American Cigar and Cigarette Company.

The Liquor Industry has had contracts for its trade-marked goods since the end of prohibition, and has been enforcing them effectively.

The State Legislature has been somewhat backward in enacting laws advanced by pharmaceutical interests, partly by reason of the deadlock which has existed in the Assembly because of the decease of one member, and also by disagreements on the vexatious tax measures.

A bill permitting the sale at retail of liquor in drug stores has been introduced in the Legislature upon agitation of the so-called Pharmacy Owners Association. The bill provides a privilege at a lower license rate than paid by the liquor dealers.

A bill instituting the Robinson-Patman Act as a state law has been introduced by Senator Feld.

The objections against the bill forbidding the preparing and serving of food in drug stores, also the serving of ice cream and soda water, seems to be powerful enough to kill the bill.

Chairman Steiger, of the Committee on the Progress of Pharmacy, reported as follows:

Salivary Immunity.—The *Journal A. M. A.* (Apr. 10th) reports in its editorial columns on enzymic factors in normal human saliva that will not only inhibit the multiplication of diphtheria bacilli *in vitro* but often kill these organisms within a few hours. Virulent diptheria bacilli *not* killed by contact with this normal salivary antiseptic are almost invariably transmuted into a virulent type. These transformed "mutants" will breed true as apparently true pseudo-diptheria bacilli for at least ten transplants in ordinary culture mediums.

The presence of these "inhibins" or bacteria-transforming enzymes in normal saliva has been confirmed by a study of salivary inhibitions and transformations of numerous other bacterial species.

Science News Letter, April 3rd. A chemical, tentatively named leukotaxine, which plays an important part in the body's fight against disease, has been discovered by Dr. Valy Menkin of Harvard Medical School.

Doctors Ehrich and Krumbhaar, of Philadelphia, report that benzedrine has a wide range of safety. Working with rats, they found that doses from 10 to 100 times the medicinal dose produced little more than an exaggeration of the remedial effects. *Science News Letter*, April 10th, reports on the First International Conference on Fever Therapy. Prof. Wagner-Jauregg who originated fever therapy, gave the following explanation of fever treatment for last stages of syphilis. Fever treatment does not cure disease by killing disease germs. In diseases like syphilis and gonorrhœa, a fever should be used with chemical treatment as a means of building up resistance of organs and body tissues against the germs, so that the infection must eventually die away by itself.

Prof. Wagner-Jauregg first tried malarial fever as a cure for general paralysis of the insane, in 1917.

This edition of the *News Letter* devotes an entire column to the centennial edition of the U. S. Dispensatory. It is pointed out that the present edition is the 22nd, and that it is three inches thick and runs to 1894 pages and 28,000 titles. The tremendous advances in medicine in the past ten years can be seen by comparing the items in this edition of the "Dispensatory" with those of the last. Ten years ago insulin for diabetes and bismuth for syphilis were just coming into use—viosterol and liver extract were unknown. Other new items are amytol-sodium, Scarlet Fever Antitoxin, Halibut Liver Oil, Plasmochin, Diptheria Toxoid and Dilaudid.

Comparison of this centennial edition with the first edition shows that of the ten most important and frequently prescribed medicines to-day only two were described in the first edition.

Merck Report.—April 1st. C. R. Addinall discusses the oxidation of Vitamin C to a reversible and an irreversible form. The literature is reviewed and statement is made that the established ideas as to stability and use of Vitamin C are valid.

The April *Druggists Circular* reports on the new treatment of sinus trouble introduced by Dr. Shorell of the Harlem Eye and Ear Hospital, N. Y. It consists of injections of an autogenous vaccine combined with a preparation of histidine. In addition to the injections a new form of heat treatment is applied. "Dry" heat as high as 100° F. is introduced into the nasal cavities.

Industrial Eng. Chem.—April 1937. Hall and Schwartz present an article on "Sanitary Value of Sodium Metaphosphate in Dishwashing."

"A bacteriological study is presented of the sanitational value of sodium metaphosphate in machine dishwashing. Results obtained in restaurants under routine operating conditions

indicate the superior sanitary quality of dishes washed with an alkaline detergent containing sodium metaphosphate. This superiority is not attributed to its germicidal action but to its specific function of preventing the formation of films of insoluble alkaline earth salts and soaps. The use of a film preventive agent in improving sanitation is a novel one."

"*Drug Trade News*, for April 12th, quotes the report of Dr. Anwyl-Davies on a specific for gonorrhœa. The product is the serum of immunized horses prepared in the London laboratories of Parke, Davis & Co. It is claimed to have cured between 60% and 70% of the more than 200 persons to whom it has so far been administered."

A letter of thanks from the Secretary of the Boards and Colleges of N. A. B. P. District No. 2 was read.

Chairman Schaefer, of the special committee, reporting on the meeting of the conference, stated that the deficit in expenses had been paid by the Mallinckrodt Chemical Company, who had acted as hosts to the visiting delegates.

Dr. Schaefer moved that the secretary be instructed to send a letter of thanks to the Mallinckrodt Chemical Co. for their coöperation. Motion was seconded and carried.

A motion was made, seconded and carried, that the report be accepted and the committee be discharged with the thanks of the Branch.

Mr. Mason announced that the speakers for the May meeting would be Dr. Herman Goodman, dermatologist, on the subject of "Cosmetic Allergy" and Dr. Frascatti, chief of the laboratories of Freminick & Co., who would supplement his remarks from the commercial viewpoint. Dr. C. P. Wimmer will be present to lead the discussion.

President Schaefer than introduced the speaker of the evening, Dr. Theodore Rosenthal, Assistant Director, New York City Board of Health, who spoke on the subject of "The Pharmacist and the Syphilis Control Program."

HORACE T. F. GIVENS, *Secretary*.

THE PHARMACIST AND THE PROGRAM FOR SYPHILIS CONTROL.

BY THEODORE ROSENTHAL,* M.D.

The members of the pharmaceutical profession, in common with the other members of the allied medical professions, have a great interest and responsibility in combating syphilis, not only as citizens and taxpayers, but because of their professional obligations and qualifications. No person of intelligence can have gone through the past few years without being made aware of the existence of syphilis as a great menace to the public health. The long standing barriers of mistaken prudery and ignorance that held back progress have finally been broken through; fortunately for our efforts at publicity, mention has been made for the first time in the public press and more recently on the radio, of the extent of this great menace. The public is thus being gradually acquainted with the facts. The history of medicine shows in successive generations how great plagues and scourges of humanity have been encountered and successfully overcome. Within the memory of all of us, typhoid fever, summer complaint of infants, diphtheria and tuberculosis have virtually been exterminated or in great part diminished, due entirely to the scientific application of medical and public health measures. In centuries gone by, bubonic plague, cholera, smallpox (in contradistinction to syphilis, called the Great Pox) had been eliminated, through advances in hygiene, sanitation and medical knowledge.

Many of us have not been aware of the extent of this all too common disease. An editorial in the *Journal of the American Medical Association*, for April 1935, stated "The conquest of syphilis is the next great objective in public health. Sufficient information indicates that it is probably the most prevalent of all communicable diseases except for measles in epidemic years."

"The history of medical progress shows instance after instance in which the combined forces of medicine and public health have conquered disease as far as public coöperation can be procured. With the combined efforts of physicians, public health officials, educators and the public, syphilis can be conquered next."

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* Assistant Director, Bureau of Social Hygiene, in charge of Education and Epidemology, N. Y. City Department of Health.

I will not attempt to bore you with statistics, but suffice it to say that it is estimated in the United States to-day anywhere from five to ten per cent of the total population is infected with syphilis. Each week nearly one thousand newly diagnosed cases of syphilis are reported to the Department of Health of this city; and we assume that there are in New York City at least 375,000 men, women and children, for syphilis infects children, too, in our city to-day.

The burden of syphilis on the community needs emphasis here. We must not lose sight of the fact that not only is syphilis a killer, causing, it is estimated about 100,000 deaths per year, but it causes great disability, both mental and physical, among its victims. The care of the vast majority of these ultimately devolves upon the taxpayer, as they become public charges, so that the cost of syphilis to the nation in dollars and cents amounts to an astonishing total.

Approximately 20–25% of patients known to be infected with syphilis, untreated or inadequately treated especially during the early stages, will develop incapacitating or fatal late sequelæ; there are in the United States approximately 115,000 patients each year developing cardiovascular or neurosyphilis.

The cost of hospitalization and of direct relief paid to disabled syphilitics, chiefly, the insane, paretic and the hopeless cardiac is very high, and may be conservatively estimated as a whole at somewhere between 35–50 million dollars per year. This sum is the cost of neglect of the early syphilitic.

The question may well be asked in view of these figures showing the extremely high prevalence, "Do we know enough about syphilis ever to eradicate it? If so, can our knowledge be applied practically?" We believe that the answer to this question is in the affirmative. As a matter of fact we know as much about syphilis as we do about any other communicable disease, including its cause, pathology, course, diagnosis, treatment and prognosis.

At present our best hope for the eventual conquest of syphilis and for relief from its burden seems to lie in the fact that syphilis can be rendered non-infectious by treatment. This is the foundation upon which has been built the success thus far attained—success that is brilliant though limited to but a few small countries. Outstanding are the Scandinavian countries. In Copenhagen the number of new cases of acquired syphilis was reduced from about 600 per 100,000 population in 1885 to less than 30 in 1933. In Sweden, syphilis has been reduced almost to the vanishing point. In 1934 only seven new cases per 100,000 population were reported. This means that syphilis is as rare in that country as typhoid fever is in New York City.

The efforts for syphilis control in New York City are being conducted not only by the New York City Health Department, but under the provisions of the Social Security Act, by the State Health Department, in coöperation with United States Public Health Service. In this way, one can see that we have a well-integrated, compact, centralized and direct attack upon the disease which has been called "The Great Killer."

In New York the program is being conducted along three main lines—education, case finding and treatment. Educational activities are concerned with the rallying of public support for the city's fight against syphilis and gonorrhœa and the dissemination of knowledge of the nature, means of spread, necessity of treatment and methods of prevention of these diseases. All the modern methods of conveying information to the public are useful and can be employed with satisfactory results provided reasonable skill and discrimination is used. No educational work is more productive of good results than the instruction of persons already infected.

It is precisely at this point that we feel the coöperation of your profession would be most helpful. We are not unaware of the favorable attitude in the past of your group in furthering educational efforts for venereal disease control. On the occasion of the Surgeon-General's Conference on Venereal Disease Control in December 1936, the following telegram was sent by the Professional Relations Committee of the New York Pharmaceutical Council. "With reference to present conference on control of venereal diseases being held in Washington, desire to assure you of interest in same by our organization. We represent approximately 4000 retail pharmacists in New York City. Anything we can do to coöperate will be gladly done."

This coöperation, voluntarily offered, is something that we wish to solicit earnestly. We should like to secure the whole-hearted asssistance of every pharmacist in this public-spirited movement. As another example of unsolicited assistance, I should like to read this letter from a pharmacist in Brooklyn. "May I take the liberty of suggesting even a better and more effective advertising agency than either our radio or newspapers in bringing to the attention of the

public the dangers and treatment of social diseases? I have reference to the neighborhood druggists of the Empire State (through the New York State Pharmaceutical Association) dressing their show windows with your propaganda at a definite time for a period of four weeks or so—the public would not only start thinking but would ask and receive from their family druggist proper information necessary to eradicate this scourge. If interested you may take the liberty of using two of my show windows for this worthy experiment. It would afford me great pleasure to plan this coöperation with you."

As a matter of fact, on a small scale, such a plan is now being carried out in the Kips-Bay Yorkville District in the east side of this city. The District Health Officer there has himself made arrangements with a number of independent pharmacists, together with a few chain stores, to distribute informative pamphlets on venereal disease to the public.

In recent years, with the decline of the general practitioner and the rise of specialization in medicine, the place of the fatherly family physician, more confidant and father confessor than exponent of the last word in medical science, has become vacant. To a certain extent the neighborhood druggist has assumed part of the rôle thus left empty. His advice is sought alike by housewife, business man and casual transient on everything from infant feeding to diseases of old age. It is within his power to become a force for great good as well as for evil.

By coöperating with the medical profession and the public health authorities, not only will his ethical and professional standards be elevated, but also his economic status will benefit.

There is no quick cure for a venereal disease; self medication and roots, herbs, amulets, love potions, charms, electrical apparatus, nostrums and other concoctions sold to the gullible at an enormous profit are worse than useless.

Few realize the extent of the trade carried on by correspondence "Specialists in Men's Diseases," Medicine Men, Witchcraft Professors, Voodoo doctors, herbalists and unscrupulous druggists.

Forty-two out of one hundred young men approached at random on the streets, in poolrooms and barbershops of one city, advised the investigator to go to a drug store for venereal disease treatment. Four told him to treat himself. Only forty, less than half, suggested going to a physician or clinic.

The *Chicago Tribune,* a few years ago sent out reporters, previously certified as being in perfect health, to call on quacks. Repeatedly they were examined, found "infected" and charged all they said they could pay for "cures." The frauds were exposed.

In New York City three studies of quackery have been conducted in recent years, one in East Harlem covering the Italian area, one in Central Harlem and a third in Chinatown.

Doctors in East Harlem in 1927 complained that a few local pharmacists were treating venereal disease patients.

Twenty-odd Chinese claiming to be doctors and owners of medicine dispensing companies were trapped in the Chinatown cleanup.

I might also point out here, that Section 343-q of Article 17B of the Public Health Law of this state says "that no person, other than a licensed physician, shall treat or prescribe for a case of venereal disease, or dispense a drug, medicine or remedy for the treatment of such a disease except on prescription of a duly licensed physician."

The question of prophylaxis is a most important and live topic. While the institution of supervised prophylactic measures has been highly successful in the military establishments, civilian prophylactic stations under trained supervision have not been successful in the United States. In civil life the question is not one of preventing or discouraging the use of properly manufactured prophylactics on the initiative of any individual. Rather the question facing the Health Officer is: How far may I go wisely in advocating such personal prophylactic measures without any opportunity to instruct the individual before exposure, or to follow him up afterwards? After a careful study Mahoney has stated that it seems evident that we do not have at our disposal at the present moment an ideal chemical method or agent, in regard to which we possess sufficient knowledge to enable the Public Health profession to advocate openly its use with the accompanying tacit assurances that by so doing the possibility of infection is entirely obviated. The most practical and promising of all venereal disease preventives is the modern sheath, but to obtain its promised results its quality must be controlled. Properly manufactured and adequately inspected, it could be marketed in a form practically 100 per cent free from de-

fects. Failures with such mechanical devices would then be due only to accidents or faulty use. It would seem clear that the Health Officer cannot yet justify placing his official stamp of approval upon these measures, which paradoxically could be the most important in our whole program for combating syphilis and gonococcal infections, if every one concerned understood and could be counted on to apply them scientifically.

Case finding, as the name indicates, means the systematic examination of individuals or groups of individuals with the proper laboratory tests. I should like to emphasize that no physical examination is considered complete to-day without a blood test. Here again an opportunity presents itself for the public-spirited pharmacist to coöperate in our educational efforts by distributing information literature, and urging inquirers to go to their family physicians, or to seek medical advice at an institution in the vicinity.

Prompt and efficient treatment, of course, is the foundation of success in the control of syphilis. It is believed that every pharmacist as an intelligent, socially minded citizen should acquaint himself with the medical facilities of his locality in addition to those of the entire city. He usually knows the physicians but he should also be acquainted with the hospitals and clinics in his vicinity, and therefore is in an excellent position to serve as a source of reliable information to the many who seek him out for advice on this matter.

We have in New York City almost 14,000 licensed practitioners of medicine and we believe these physicians constitute the shock troops in our battle against syphilis, more valuable than all the clinics and hospitals, both public and private in the city. The practical aids which the Department of Health offers to the physician may be briefly described as follows:

1. *Diagnostic Services:* The Department of Health laboratory performs without charge serologic tests for syphilis (215,000 specimens tested last year). At every one of its fourteen diagnostic centers blood specimens are taken for private physicians on request. Darkfield examinations and diagnostic consultations are offered in these centers, the reports being sent directly to the physicians.

2. *Treatment Services:* In order to enable private physicians to care for a larger number of patients having syphilis, especially those who cannot pay the regular fee, the Department of Health provides neoarsphenamine, bismuth or mercury in amounts sufficient for one year of treatment. These drugs are to be supplied free upon request without distinction as to the patient's ability to pay a full fee or any fee for his service.

3. *Educational Activities:* The Sanitary Code requires that every person found by a physician to have syphilis or gonorrhœa shall be given a pamphlet of instruction with regard to his infection and the protection of contacts.

In a general way, then, we wish to enlist the active support of all the pharmacists of this city in our policies and efforts.

Specifically, it is felt that much can be accomplished by distribution of pamphlets, in some cases exhibition of suitable window displays, but basically by intelligent advice properly given.

The hope of success in combating syphilis, in reducing its prevalence and mortality rates, lies in full understanding and coöperation among all who are responsible for any phase of the program. Without expecting miracles, but anticipating that the changes will be indicated as we progress, we believe that a start in the right direction has been made and that with the coöperation of the medical profession, your group, hospitals and social agencies, we shall, if we persevere, see a radical reduction in the prevalence of syphilis and in the disasters which it causes.

NORTHERN OHIO BRANCH.

The Northern Ohio Branch of the AMERICAN PHARMACEUTICAL ASSOCIATION met at the Faculty Club of Western Reserve University, April 9th. As usual, this was a dinner meeting, twenty-seven members being in attendance.

Following the procedure for conducting meetings that was inaugurated a year ago, President F. J. Cermak had arranged for two talks by fellow-members on some phase of pharmaceutical practice. Joseph Jephson gave a short talk on professional practices, the salient points of which were:

1. The successful pharmacist must give something more than merchandise.
2. A good looking and substantial package has more than merchandising significance in the drug business. Packages, for illustration, were displayed.
3. The customer should be made to feel that the pharmacist plays no favorites.

The second speaker, Doctor L. D. Edwards of the School of Pharmacy faculty, Western Reserve University, discussed the new official biologicals. After reviewing the pharmacology of these products, Dr. Edwards, at the request of several members, gave considerable detailed information on the origins and preparation of all the U. S. P. biologicals.

N. T. CHAMBERLIN, *Secretary.*

NORTHERN NEW JERSEY.

The regular monthly meeting of the Northern New Jersey Branch of the AMERICAN PHARMACEUTICAL Association was held at the Rutgers College of Pharmacy, March 15th, with an attendance of about twenty-five members and friends. Professor Adolph Marquier presided.

Chairman Robert W. Rodman, of the program committee, introduced Anton Hogstad, of Anton Hogstad Associates, as the speaker of the evening.

Dr. Hogstad predicted a revival of learning; a rediscovery of the ancient and honorable profession of the apothecary. He stated that the pharmacist is entitled to the same respect as is accorded to the physician, the lawyer and minister. To merit this respect the pharmacist must fill in the cultural background. The position of the pharmacist in the community is that of a clearing house for scientific and medical information. This position can be filled only by keeping abreast with the current literature of the medical and allied sciences. To do this necessitates the addition of an extensive library to the workshop.

Many of our druggists have followed the more difficult lane and lost themselves in the maze of commercial competition and lost for themselves the more pleasant path of intellectual competition that had been opened for them by their scientific educational background.

CYRUS L. COX, *Secretary.*

NORTHWESTERN BRANCH AND THE SCIENTIFIC AND PRACTICAL SECTION OF THE MINNESOTA STATE PHARMACEUTICAL ASSOCIATION.

The meeting of above-named bodies was held at St. Paul Hotel, April 5th, 11:00 A.M. to 5:00 P.M.

The meeting was presided over by Dean Emeritus F. J. Wulling, chairman of the Scientific and Practical Section, assisted by chairman E. B. Fischer, of the Northwestern Branch.

Following the chairman's address and reports by the chairmen of sixteen standing committees Dr. Bernard Fantus of the School of Medicine of the University of Illinois addressed the meeting upon the subject "Some Useful Prescriptions."

The meeting then adjourned to the ballroom where Dr. Fantus addressed a luncheon group of pharmacists and physicians of Minnesota upon various phases of interprofessional relationship work.

The pharmacists then adjourned to the convention room where the following papers were presented:

1. "The Pharmacology of Benzedrine," Fred G. Kusterman.
2. "A College of Pharmacy in Your Store," N. Vere Sanders.
3. "Some Glimpses of the Practice of Pharmacy in a Hospital," Sister Constans.
4. "Some Phases of Ethical Pharmacy," Abe Strimling.
5. "The Microscope in Pharmacy," Chas. E. Smyithe.
6. "Recent Advances in Our Knowledge Concerning the Constituents and Uses of Ergot," Earl B. Fischer.
7. "Problems in Dispensing," Gustav Bachman.
8. "Solution of Magnesium Citrate U. S. P. XI," George Crossen.
9. "Granulocytopenia Due to Aminopyrine," Chas. V. Netz.
10. "Research in Pharmacy," Glenn L. Jenkins.
11. "Pharmaceutical Progress in Anemia Therapy," Mr. Edward Brecht.

12. "The Scientific Basis of Sunburn Prevention," Miss Phyllis Brewster.
13. "New Products and Methods of Burn Treatment," Curtis Waldon.
14. "The Uses of Sulfonated Oils and Their Compounds in Pharmaceutical Preparations," Miss Laurine Jack.
15. "Studies on Synthetic Pressor Drugs of the Ephedrine and Epinephrine Type," Kenneth L. Radke.
16. "The Pharmaceutical Institute of 1937," Joseph Vadheim.
17. "The College of Pharmacy, 1935–1936," Historical, F. J. Wulling.
18. "Dr. Chas. Rice, Scholar," F. J. Wulling.
19. "Study of the Various Methods of Determining Moisture and Their Application to the U. S. P. Syrups," Miss Laurine Jack.
20. "Continuation Study for Pharmacists," Chas. H. Rogers.

All of the committee reports and papers presented before the session will be printed in the "Proceedings of the Minnesota State Pharmaceutical Association for 1937."

CHAS. V. NETZ, *Secretary.*

PHILADELPHIA.

The April meeting of the Philadelphia Branch, AMERICAN PHARMACEUTICAL ASSOCIATION, was held April 13th in the Auditorium of the Philadelphia College of Pharmacy and Science.

The minutes of the March meeting were read and approved. L. L. Miller presented the name of Vernon Bachman for membership. Mr. Bachman was elected to membership by unanimous vote.

The secretary asked the instruction of the Branch on the status of newly elected members of the parent body, pointing out that under the old policy the Branch received a rebate out of the initial payment to the parent body which covered the dues of the member for one year in the Branch and that under the present policy the Branch receives fifty cents annually from the parent body so long as the member continues to pay dues to it.

A motion was made and carried, providing that persons attaining membership in the AMERICAN PHARMACEUTICAL ASSOCIATION shall be considered as having membership in the Local Branch for one year dating from the date of his membership in the parent body. Thereafter such members shall pay the usual annual contribution of one dollar.

Upon motion of James C. Munch the secretary was instructed to re-open the question with Secretary Kelly as to whether persons may be considered active members of the Branch, who are not members of the AMERICAN PHARMACEUTICAL ASSOCIATION.

President Kendig asked the membership to suggest to him in writing the names of members who might serve on standing Committees of the Branch. He announced that the appointments to these Committees would take place in the near future.

The Speaker of the evening, Dr. Herbert Marshall Cobe, of the Temple University School of Pharmacy, was then introduced. Dr. Cobe spoke on the subject, "The Pharmacist and Allergy." He emphasized the fact that Allergy has become a highly specialized branch of Medicine and that diseases such as hay fever, bronchial asthma, gastro-intestinal hypersensitivity, contact dermatitis and drug hypersensitivity are conditions which are best placed in the hands of the competent Allergist. Dr. Cobe mentioned that there are 263 proteins which are known to have caused cases of bronchial asthma and that 136 drugs give rise to allergic conditions in certain individuals. Common among these drugs are quinine, aspirin, cocaine, amidopyrine and the barbiturates.

Following the address several members asked questions which resulted in much interesting discussion.

Upon motion by Arno Viehoever, seconded by Dr. LaWall, the speaker was accorded a rising vote of thanks.

Nathan Zonies reported that he had just returned from Harrisburg where he had attended Senate Committee hearings on bill No. 534 which aims to restrict the sale of drugs of all kinds except several specifically named household remedies to drug stores; and on bill No. 703 which is a replica of the Federal Copeland Bill. Mr. Zonies stated that the Senate Committee seemed favorably impressed by testimony of witnesses supporting these bills.

ARTHUR K. LEBERKNIGHT, *Secretary.*

UNIVERSITY OF SOUTHERN CALIFORNIA STUDENT BRANCH.

A meeting was called to order on January 14, 1937, by President Harold Miller during chapel period. Being the first meeting of the year, a discussion on a membership drive was begun, after the reading of the minutes.

It was decided to make a rebate of 10% to any student in the college, making the total membership fee $4.00 instead of $5.00. An instalment plan was also accepted, in which a contact member collects fifty cents weekly until the required sum is obtained.

After a short report on the botanical garden by Harold Miller, the meeting was adjourned.

FEBRUARY.

President Miller opened the meeting on February 18, 1937. After the usual roll call and reading of the minutes, contact-member, Peter Bedrosian, made a brief report on the progress of the membership drive. He stated that over half of the prospective members have paid and wished to know whether these names should be turned into the home office. It was decided to wait until all members had paid in full.

A report on the botanical garden by Andrew Croal then followed. He also expressed sincere thanks to the administration for its donation of the generous plot of ground to Mrs. Kurschner for her many plant donations and the AMERICAN PHARMACEUTICAL ASSOCIATION for its donation of $5.00.

An election was held for Vice-President to fill the position vacated by David Ostrom who did not return this semester. Peter Bedrosian was elected.

President Miller then read a letter from our honorary president, Albert Musick, who is making a generous donation of two memberships in the AMERICAN PHARMACEUTICAL ASSOCIATION annually, to be named the, "Albert Musick Prize."

Harold Miller suggested that the program of this organization include a monthly business meeting and a monthly gathering with a speaker. The plan was accepted.

Before adjournment, Ernest Yamaguchi made a motion to the effect that $5.00 more be donated to the botanical garden fund. This was unanimously accepted.

MARCH.

On March 17, 1937, Dr. H. R. Cooder, a prominent Los Angeles physician and child specialist, spoke on "A Doctor Looks at a Drug Store."

After the interesting talk the students' comments were, "That's the kind of talks we need." Further programs are to be presented.

APRIL.

A short business meeting was opened on April 8, 1937 with the roll call—President Miller presiding. Correspondence from Secretary E. F. Kelly, and Chairman A. Ziefle, of Committee on Local Branches and Student Branches, was read. The latter hoped that the botanical garden would be established soon, so that he can make a report at the New York convention. He also asked for a brief report on the program for the year.

Plans for a luncheon were formed and the date was set for May 12th at Æneas Hall. Reservations for a hundred are to be made. Dean Stabler was chosen as the speaker.

Peter Bedrosian made a motion to invite all members of the AMERICAN PHARMACEUTICAL ASSOCIATION to the luncheon. This motion was accepted. Ernest Yamaguchi was appointed to purchase two door prizes for the occasion.

President Miller appointed Hugh Bubar to correspond with several of the large manufacturing houses, requesting them to make a presentation to the graduating seniors of the College of Pharmacy.

The remainder of the period was spent in discussing the problems of the pharmacist's union in Los Angeles, and the N. F. Syrup of Cherry.

MASARU MASUOKA, *Secretary.*

The Annual Meeting of the AMERICAN PHARMACEUTICAL ASSOCIATION and affilitiated organizations will be held during the week of August 16th—the week of Plant Science Seminar to be named.

CITY OF WASHINGTON BRANCH OF THE AMERICAN PHARMACEUTICAL ASSOCIATION.*

The Meeting of the City of Washington Branch of the AMERICAN PHARMACEUTICAL ASSOCIATION was called to order on Monday evening, April 19, 1937, in the Assembly Room of the AMERICAN INSTITUTE OF PHARMACY.

The minutes of the previous meeting were read and approved.

President Briggs appointed a program committee consisting of: L. E. Warren, *Chairman*, and Messrs. Delgado, Fuller, Kelly, Swann and Maxwell.

President Briggs introduced Alfred L. Tennyson, Chief, Narcotic Section, Office of the General Counsel, Treasury Department, as the first speaker of the evening. He read a paper entitled "Federal Narcotic Law Enforcement, Past and Prospective."

The next speaker was H. C. Fuller, former secretary of the Branch, who gave a comprehensive and interesting lecture on assays of official products. He stated that the general procedure for assaying given in the official books is better than in any previous edition, although some of the assays are impracticable for the use of the average retail druggists.

A general discussion followed.

President Briggs introduced L. E. Warren, Chemist of the Food & Drug Administration, member of the Editorial Committee of the *Journal of the American Official Agricultural Chemists*, and special contributor to the U. S. P. XI Revision Committee. His topic was "The Association of Official Agricultural Chemists and Their Work on Drug Research."

Under new business Dr. McCloskey offered the following resolution:

> "Be it resolved by the City of Washington Branch of the AMERICAN PHARMACEUTICAL ASSOCIATION, that the funds of this Branch be deposited in the Riggs National Bank, northwest office, and that the signature of the president, W. Paul Briggs, and the treasurer, William T. McCloskey, be required on each of the checks before withdrawal of funds can be made."—Passed.

Chairman W. E. Warren, of the Program Committee, gave a tentative program for the May meeting. It was suggested that a practical, a scientific and a legal paper be given at each meeting.

Mr. Howes moved that the Legislative Committee take up the matter of violations under the Robinson-Patman Bill. Duly seconded and passed.

V. B. NORELLI, *Secretary*.

* The report came in after section was made up.

FEDERAL NARCOTIC LAW ENFORCEMENT; PAST AND PROSPECTIVE.*

BY ALFRED L. TENNYSON.[1]

More than 20 years ago, the first International Opium Convention destined to have a measure of world-wide effectiveness was signed at the Hague by delegates from 12 world powers, including the United States of America. Almost coincidentally with the ratification of this international agreement, Congress passed, and the President approved on December 17, 1914, the law which has for the past 22 years formed the principal basis for the limitation, to medical and scientific purposes, of manufacture and sale of opium and coca leaves and their several alkaloids. This law is the so-called Harrison Narcotic Act and I am sure that all of the members of this audience are familiar with its terms.

The duty of enforcing the new law was imposed upon the Bureau of Internal Revenue, and field officers of that Bureau undertook the investigative work in conjunction with their work of enforcement of the general internal revenue laws. There was some doubt among members of the dispensing professions as to just what was meant by the limiting term "professional practice" as used in the new law and whether, assuming that the limitation sought to prevent the mere gratification of drug addiction, it would be held valid from the constitutional standpoint. It was inevitable that these questions would be presented sooner or later for judicial decision.

* Read before Washington Branch, A. PH. A., April 19th.

[1] Attorney, Bureau of Narcotics.

Prior to the Harrison Law, unless prohibited by some state statute, it was lawful for a practitioner to prescribe morphine for, or dispense morphine directly to, an addict merely to keep him comfortable by maintaining his customary use, and under the same circumstances, morphine was lawfully purchasable across the counter of the drug store without a physician's prescription.

The first case to test the constitutionality of the new law was that of a doctor, C. T. Doremus, and the Supreme Court held that Section 2 was constitutional by a vote of 5 to 4. In the next case decided, that of Webb and Goldbaum *vs.* United States (Webb being a physician and Goldbaum a druggist) the Supreme Court, also by a vote of 5 to 4, established the principle that a written order for drugs, not for the treatment of any disease or for an attempted cure of the habit but only for the gratification of drug addiction, was not a physician's prescription within the meaning of Section 2, and in the later case of Jin Fuey Moy (a physician) *vs.* United States, the court made it clear that such a written order for drugs protected neither the physician who issued it nor the druggist who knowingly filled it.

These decisions, for a few years at any rate, set at rest any doubts as to the validity of the act as it applied to the dispensing professions. They also served notice that "professional practice," under the act, did not include a practice of catering to drug addiction as such. Probably the great majority of members of these professions had already assumed that "professional practice" meant what the Supreme Court later announced and it is fair to state that the Supreme Court's rulings did not necessitate any great change in the handling of narcotics in so far as the conscientious practitioner or pharmacist was concerned. That there were a few who were willing to make money by perpetuating drug addiction and to assert their alleged right to do so under the cloak of professional practice, is made evident by the number of cases reported in the decisions of the Supreme Court and the various Federal courts subordinate thereto.

The constitutionality of the Harrison Act, particularly as to Sections 1 and 2, was again challenged before the Supreme Court in 1927 and 1928; this time by persons not members of the dispensing professions, but the Supreme Court again upheld the law—in both cases—by a vote of 6 to 3.

The rights and obligations with respect to the handling of narcotic drugs by the dispensing professions being fairly well outlined in a general way by the Jin Fuey Moy decision, enforcement of the act proceeded under the Narcotic Division of the newly established Prohibition Unit of the Bureau of Internal Revenue. There continued to be developed cases of improper prescribing and dispensing of narcotics by the dispensing professions, but there were many more cases of ordinary peddling which indicated that the principal source of supply of drug addicts was drawn from smuggled narcotics. With the establishment of the Bureau of Narcotics in 1930, the Commissioner of Narcotics adopted a policy of directing special effort toward the detection and prevention of smuggled shipments to the United States. This policy bore fruit in the shape of unusually large seizures of narcotics sought to be smuggled in during 1930 and 1931, a notable example being a shipment of 17,500 ounces of morphine billed as furs and shipped from Istanbul *via* the Steamship Alesia. A Convention was concluded at Geneva on July 13, 1931, and later ratified by most of the world powers, which obligated the High Contracting Parties to limit their manufacture of narcotics to those quantities only which were estimated to be necessary to provide for the world's medical and scientific needs, and the operation of this Convention tended to decrease surplus manufacture of narcotic drugs abroad which supplied the smugglers. While the new enforcement policy, supplemented by the operation of the Convention, did not cause smuggling to cease entirely it has unquestionably reduced supplies heretofore available from smuggled sources and the high prices maintained in illicit markets plus greater adulteration of narcotics reaching the ordinary addict give eloquent testimony to this effect.

With the curtailment of supplies from smuggled sources, it was to be expected that greater pressure would be brought to bear upon some members of the dispensing professions to supply the deficit and unfortunately some doctors and druggists succumbed to this pressure to such an extent that diversions of narcotic drugs from legitimate channels began to increase to an alarming degree. For instance, in the City of Richmond during 1934 and 1935, four physicians issued prescriptions which were filled by about eight druggists, for a total of 66 pounds of morphine, whereas the remaining 325 physicians of the city required only four pounds of morphine during the same period to care for the medical needs of all their patients. These four physicians wrote hundreds of prescriptions calling for from 15 to 60 grains of morphine each for drug addicts, many of whom flocked into

Richmond from other states, many of the prescriptions being written under false names and giving fictitious addresses. In the City of Seattle, Washington, one physician had made it a practice to sell hypodermic injections to drug addicts and purchased for this purpose over a period of some four or five years a total of nearly a half million $^1/_2$-grain morphine tablets. Enforcement activity has eliminated these diversion sources, at least for a time, but it is a matter of some concern to the Bureau that the offending persons still retain their licenses to practice their respective professions. The Bureau is of the opinion that such utter disregard on the part of a licensee of his duties under the Federal law and to the state which entrusted him with his license, as well as to the honorable profession he represents, should be penalized by a revocation of that license.

During the past few years the abuse of another drug has become so wide-spread as to merit the adoption of vigorous control measures. I refer to marihuana or cannabis, which is usually used for abusive purposes in the form of cigarettes, sold at an average price of three for 25¢. These cigarettes have been made from the flowering tops of the pistillate plant cannabis and there has been evidence of their use even among children in the secondary schools. I believe it is unnecessary to comment upon the demoralizing results of the smoking of marihuana cigarettes, excepting to express the personal opinion that, from reports which reach the Bureau, the constant indulgence in their use seems to be productive of results even more vicious than that following the continued use of morphine. At this time there is in effect in every state some type of law which has for its object the control of the traffic in marihuana, but there is no special legislation of this type in effect in the District of Columbia. The cannabis plant is understood to be of a hardy nature and may be grown probably in every State of the Union. It has been found to be cultivated even in or near urban communities, and it is also found growing as a roadside weed. While the flowering tops of the pistillate plant have heretofore been considered the principal source of the dangerous resin, it has been learned only recently that the resin may also be obtained from the leaves of the male plant as well. It follows that any system of legislative control over the production of and traffic in cannabis should carefully define the term, and not limit the application of control measures to the flowering tops of the plant as has heretofore been the case. There has been submitted to Congress for its approval a proposed bill, drafted in the Treasury Department, which seeks to afford a degree of nation-wide control over cannabis through the medium of a taxing act, and it is hoped that this measure, if approved, will have the whole-hearted support of the dispensing professions.

The future enforcement program of the Narcotic Bureau, as I see it, consists in

1. Continued coöperation with foreign countries, through the State Department, looking toward enforcement of the narcotic conventions.
2. Continuance of activity, in coöperation with the Bureau of Customs, toward prevention of narcotic smuggling.
3. Directing investigations toward the detection and prevention of the so-called street trafficking in narcotics while carefully checking the prescribing and dispensing of narcotics by the dispensing professions.
4. Coöperation with state and municipal authorities in the enforcement of state narcotic laws and municipal narcotic ordinances designed to control the intra-state narcotic traffic, both as to the drugs covered by the Federal laws and marihuana; and
5. The enforcement, if approved, of the Federal marihuana taxing act.

Coincidentally with this program the Bureau hopes to solicit and receive greater cooperation from the state authorities toward the elimination from the dispensing professions of those members who are guilty of serious narcotic irregularities, as well as the provision of scientific care and treatment for the unfortunate narcotic drug addict population. I believe this entire great problem is capable of solution only through the coöperation of both Federal and State agencies which have a joint responsibility in suppressing the abusive use of the dangerous drugs discussed, but this theory presupposes the hearty coöperation of the dispensing professions, of which the great majority, I believe, are in sympathy with the aims of the Bureau of Narcotics.

REPORT OF THE 14TH ANNUAL PLANT SCIENCE SEMINAR.

The 1936 meetings of the Plant Science Seminar were held at a camp in Robbers' Cave Park, nine miles north of Wilburton, Oklahoma. This camp with its nine buildings of native stone, delightfully situated in the pine-oak association of the San Bois Mountains served as a splendid background for the Seminar. At various intervals on August 17th, the members drove into camp. Registration and assignment to quarters having been completed, the day was spent in renewing old, and making new acquaintances. After a delightful dinner at seven, Executive Kelly DeBusk, of Chocta Area Council, Boy Scouts of America, McAlester, Oklahoma, reviewed surrounding territory, rich with the lore of territorial days.

August 18th, Glenn Couch of the botany department of the University of Oklahoma, discussed the botany of the state in relation to its topography, after which the party climbed to Robbers' Cave, an out-cropping of limestone, celebrated for the hide-out it once offered to outlaws. Belle Starr, the notorious woman bandit of territorial days, is reputed to have corralled her horses in this region. After investigating this unique rock formation with its caverns and natural corral the party proceeded on a short hike and botanizing excursion under Mr. Couch's direction. Tuesday afternoon was devoted to the first regular session of the Seminar. Dean D. B. R. Johnson of the School of Pharmacy of the University of Oklahoma welcomed the Seminar in behalf of the College and the University. "Oklahoma," said Dean Johnson, "is a new state, rich not only in mineral deposits, borax and oil but also in plant life." Over six hundred drug plants may be found in the state. Dean Johnson's welcome was followed by the president's address in which President Bacon reviewed the history of the Seminar since its beginning in 1923. Several members paid tribute to the memory of the late Dr. Eggleston, a frequent attendant of past seminars. It was voted that an appreciation of Dr. Eggleston's work be prepared by Dr. H. W. Youngken. (See April JOURNAL, page 364.) The following papers were read: "Ultra Violet at a Cost That Every Pharmacognosy Laboratory Can Afford," by M. S. Dunn; "The Mysterious Wonder Herb," by L. D. Hiner; "Microcrystalline Profiles and Silhouettes," by A. C. Shead (read in Dr. Shead's absence by L. E. Harris); and "Notes on the Effects of Certain Animal Glandular Products on Plant Growth," by M. S. Dunn. Regrets of being unable to attend were read from Day, Dye, Leake, Richtman and Youngken. One of the usual seminar round-table discussions was begun, which terminated in a watermelon feast, the watermelons coming from Dr. Harris' garden at Norman. Many of the seminarians saw for the first time, watermelons with yellow centers. The evening was occupied by open-air movies. L. K. Darbaker, official cinematographer of the Seminar, exhibited movies of the past seminars and other of his excellent reels.

On August 19th the seminar made an all-day auto trip across the border into the Ouichita National Forest of Arkansas, to the top of Rich Mountain. The trip was under the direction of Frank J. Gibbs, Assistant State Forester of Oklahoma. The ruins of the Frisco Lines hotel at Mt. Rich were of interest as was also botanizing under the direction of Messrs. Gibbs, Rich and Gibson. Among the plants of interest were several species of magnolias, the shrub horse-chestnut, passion flower, fields of peanuts, ginseng, pines (principally *P. echinata*), oaks (principally *Q. marilandica* and *Q. stellata*), several species of gum trees, redbud, black gum, red gum, sassafras, catnip, burdock, poke weed, wahoo, witch-hazel, *Smilax rotundifolia*, flowering dogwood, etc. After dinner every one joined in a song-fest, the leaders of which were Mrs. Johnson, Mrs. Elich and Dr. Bacon.

The morning of August 20th was devoted to a short hike and botanizing trip under the direction of Mr. Couch. The trip covered a small region of the San Bois Mountains just east of the camp. Among the points visited was a fire tower from which point of vantage the party obtained an excellent view of the surrounding territory. Thursday afternoon was given over to the second session of the seminar. Two papers: "The Cultivation and Assay of Pyrethrum Grown at Squire Valleevue Farm," and "The Cultivation of Digitalis," were read by F. J. Bacon. These were followed by a round-table discussion in which teaching methods, laboratory methods, drug cultivation and other pharmacognostical subjects were discussed. Plans for next year's seminar were considered. The meeting concluded with a vote of thanks to L. E. and Mrs. Harris, and to the staff of the University and of the camp, whose efforts made the 1936 meeting one of the outstanding seminars. Officers for the 1937 Seminar were elected as follows: *President*,

L. K. Darbaker;[1] *Vice-President*, E. H. Wirth; *Secretary-Treasurer*, L. E. Harris. *Council Members*, F. J. Bacon; F. H. Eby.

After breakfast, Friday morning, the members broke camp and proceeded by auto caravan through the Ada Oil Fields. Stops were made at Sulphur and Turner Falls after which the party proceeded to Dallas.

Attending the 1936 Seminar were: F. J. Bacon, Cleveland, O.; R. D. Bienfang, Norman, Okla.; Miss Carolyn Binder, Oak Park, Ill.; P. D. Carpenter, Chicago, Ill.; Glenn Couch, Norman, Okla.; L. K. and Mrs. Darbaker, Pittsburgh, Pa.; M. S. and Mrs. Dunn, Philadelphia, Pa.; C. T. Eidsmoe, Brookings, S. Dak.; Mrs. Herman Elich, Chicago, Ill.; R. W. Elich, Chicago, Ill.; Wm. Felkner, Norman, Okla.; E. N. and Mrs. Gathercoal, Chicago, Ill.; F. J. Gibbs, Oklahoma City, Okla.; Dr. Katherine Graham, Chicago, Ill.; Miss Ina L. Griffith, Norman, Okla.; L. E. and Mrs. Harris, Norman, Okla.; Miss Lorene A. Harris, Norman, Okla.; L. D. and Mrs. Hiner, Brookings, S. Dak.; E. J. Ireland, Gainesville, Fla.; D. B. R. and Mrs. Johnson, Norman, Okla.; Ray Johnson, Norman, Okla.; L. F. and Mrs. Jones, Indianapolis, Ind.; A. W. Matthews, Edmonton, Alberta; J. E. and Mrs. Seybert, Indianapolis, Ind.; Elbert Voss, Pittsburgh, Pa.; Miss Marilyn Wirth, Oak Park, Ill.; and E. H. Wirth, Chicago, Ill.

See pages 364, 374, 375.

FAIR TRADE LEGISLATION.

PARTS OF AN ADDRESS BY R. L. SWAIN AT THE RECENT MEETING OF GEORGIA PHARMACEUTICAL ASSOCIATION.

First of all, what is the fair-trade movement? The fair-trade movement is an attempt to maintain free and open competition in retail trade by eliminating those business practices which tend to monopoly. It is aimed at loss-leader selling, predatory price cutting and the other nefarious business methods, which have crushed the small business men of this country into economic servitude. It is an attempt to restore some semblance of economic security to the independent, and to preserve for him a decent place in the scheme of distribution. Its greatest merit is that it is devoted to that traditional American notion that the doors of opportunity shall be kept open to one and all and on equal terms. It is forever opposed to economic discrimination and oppression. It is fair to big and small.

What is a fair-trade law? A fair-trade law is an act of a State legislature, aimed at the elimination of the evils of loss-leader selling. Generally speaking, these acts make lawful contracts between the manufacturer and his distributors, whereby minimum resale prices are set up for trade-marked, identified merchandise, which is in free and open competition with other merchandise of the same general class.

Are producers permitted to agree among themselves regarding resale prices? The fair-trade acts, without exception, prohibit all agreements between producers, between wholesalers or between retailers. They authorize vertical price agreements, but prohibit horizontal price agreements. In other words, competition between producers is in no sense lessened.

Are all commodities subject to fair-trade agreements? The fair-trade acts are limited to trade-marked commodities, which are in free and open competition with commodities of the same general class produced by others. Competition is the key-note of the agreement. If competition is not present, then no contract can be entered into.

Are fair-trade acts price-fixing acts? In an unanimous decision by the Supreme Court of the United States, in which the Illinois and California Fair Trade Acts were upheld, the fair-trade laws are declared not to constitute price fixing. The fair-trade laws are aimed at recognized evils in retail distribution, which are undermining free competition and tending to concentrate retail business in the hands of a relatively few large concerns. By eliminating loss-leader selling, the fair-trade acts seek to keep the doors of opportunity open for the small dealer. The minimum retail price in fair-trade contracts is incidental, the main purpose being to keep the channels of competition free and open, and to check those recognized unfair trade practices which tend to monopoly.

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[1] Page 374.

Have the fair-trade laws been fair to the consumer? In so far as there is evidence available, the answer is yes. Impartial studies made of the situation in California, where the act has been in effect for several years, have shown that prices have not been to the detriment of the consuming public. Studies made under the NRA codes show that there was a leveling-out of retail prices, which resulted in benefits to the consumer.

This whole fair-trade program would be an overwhelming success if the public could be made to see just what predatory loss-leader selling means. The Supreme Court, in the Illinois Fair Trade Case, stated: "There is a great body of fact and opinion tending to show that price cutting by retail dealers is not only injurious to the good-will and business of the producer and distributor of identified goods, but injurious to the public as well."

The key-note of the fair-trade program was sounded back in 1912 by the eminent Louis D. Brandeis, before he became a member of the Supreme Court. In a classic discussion of the subject, Mr. Brandeis said: "When a trade-marked article is advertised to be sold at less than the standard price, it is generally done to attract persons to a particular store by the offer of an obviously extraordinary bargin. It is a bait, called by the dealers a "leader." But the cut price article would more appropriately be termed a "mis-leader;" because ordinarily the very purpose of the cut price is to create a false impression."

The late Justice Oliver Wendell Holmes had an uncanny sense in going to the heart of any controversy. In the celebrated Miles case, the learned jurist said: "I cannot believe that in the long run the public will profit by this Court permitting knaves to cut reasonable prices for some ulterior purpose of their own, and thus to impair, if not to destroy, the production and sale of articles which it is assumed to be desirable and that the public should be able to get."

The fair-trade movement is aimed at destroying the cant and hypocrisy of that group which has sandbagged the buying public into believing that a cut price is in the public interest. It is intended to give the public, the producer and the distributor a fair and decent break. It will bring peace and order into distribution, and provide a sounder and cleaner method of competition. It will make possible better hours and wages for employees, and bring about improved conditions of employment. It is a social and economic force, aimed at bettering the conditions under which people live and labor.

Because of these underlying principles, fair-trade acts have been enacted in thirty-nine states, representing well over 90,000,000 of the population of this country. The states, faced with drastic economic problems in the field of distribution, have seized upon the fair-trade acts as a means of solution. They have seen in the movement some hope that economic security can be found for the independent retailer, and at the same time a hope that the buyer can be freed from the deception and fraud of those who profit from the predatory route.

However, from the very start, it was apparent that the State acts could not effectuate their purposes without congressional action. There was the fear that in some respects contracts made under the fair-trade laws might infringe some of the provisions of the Sherman Act. It was to allay this fear, and at the same time remove all doubt on the subject, that the Tydings-Miller National Fair-Trade Enabling Act was introduced into Congress. Its sole purpose is to remove Federal obstacles to the operation of fair-trade contracts which the states themselves have declared lawful.

It is interesting, at this point, to note the economic and political philosophy of Senator Millard E. Tydings of Maryland and Congressman John E. Miller of Arkansas. These men gave their names and prestige to the National Fair Trade Enabling Act, and have thus allied themselves with the forces seeking to bring peace and decency into the field of distribution.

In his address before the National Association of Retail Druggists' convention in Pittsburgh last year, Senator Tydings said: "Is the country better off with a relatively large number of independent retailers, or shall we concentrate distribution in the hands of a few? The question as I see it admits of but one answer. I believe it to be the duty of the government to protect the weak against the strong, and to keep the channels of trade free and open to all. I subscribe without reservation or restraint that democracy in government is a mockery unless there is democracy in opportunity.

"Because of studies that I have made of the problems now raging in distribution, I am convinced that there is an urgent need for the National Fair Trade Enabling Act."

The note sounded by Congressman Miller is no less high. In a recent statement, he said:

"I have a great interest in the survival of the independent business man in the field of distribution in this counrty, believing that his survival is essential to the maintenance of our democratic institutions.

"I have given a great deal of study to the basic principles underlying the State Fair Trade Acts, and approve them fully as a rational method of outlawing certain predatory practices in commerce which have contributed in a large measure to the decimation of the ranks of independent business men in all parts of the country—namely, predatory price cutting and loss-leader selling.

"I believe that the principles of fair-trade legislation, as embodied in the acts now on the statute books of fifteen states, if brought to full effectiveness by the National Enabling Act, will result in benefit to independent business men and the general public."

First of all, the manufacturer's right to control his prices is not dependent upon the fair-trade acts. The cost of materials plus the costs of production plus the costs of distribution plus the forces of competition are what control the manufacturer in determining what his price shall be. Any sane man knows that prices are not arbitrarily fixed. Every sane man knows that no manufacturer would so unduly raise his prices as to incur the resentment of the public. Then, too, it must be borne in mind that no commodity can be made the subject of a fair-trade agreement unless it is a trade-marked commodity, and in free and open competition with commodities of the same general class produced by others. Imagine the absurdity of saying that a manufacturer of a tooth-paste would so unduly raise his prices as to incur the resentment of the public, when there are scores of tooth-paste manufacturers all keenly competing for the favor of the consumer. This is a principle so elementary that even the Federal Trade Commission should be aware of it.

The basic meaning of the fair-trade acts, in so far as their bearing upon competition is concerned, was admirably stated by the Honorable Robert H. Lehman, Governor of New York, when he signed the fair-trade act of that state: "The prices of commodities that are sold in fair and open competition with other commodities of the same general class will always be subject to control by the powerful forces of competition. If a manufacturer markets his products at a price which the consumer deems too high, the consumer will naturally purchase a commodity of the same type produced by another manufacturer who is willing and able to market at a lower price."

AN EGYPTIAN PHARMACOPŒIA.

Liberty is taken in quoting the following from *The Pharmaceutical Journal*, April 17, 1937.

"A review of fourteen national pharmacopœias has been contributed to the *Journal of the Egyptian Medical Association* by Professor I. R. Fahmy, of the University of Cairo. Marked differences between substances bearing the same names are shown, and variations in national standards which also arise are pointed out. Where prescriptions contain a mixture of preparations from different pharmacopœias, the dispenser is often uncertain as to which pharmacopœia should guide him, a situation which apparently often arises in Egypt.

"Professor Fahmy suggests that the present chaos prevailing in Egypt can be stopped by one of three possible methods: By accepting one of the commonly used pharmacopœias in the country as the official Pharmacopœia and compelling all medical practitioners in Egypt to use it. Against this proposal there is the difficulty of finding a pharmacopœia which would suit the needs of the country. By compelling medical practitioners to write the name of the pharmacopœia to be used by the pharmacist. 'This is impracticable,' states Professor Fahmy, 'owing to the difficulty of stocking all the preparations of the various pharmacopœias in one pharmacy.' His third suggestion—the production of a national pharmacopœia suitable for the needs of the country—is put forward as the only acceptable proposal; one which should be the main object of those interested in the progress and welfare of the sciences of medicine and pharmacy in Egypt."

ASSOCIATION BUSINESS

AD INTERIM BUSINESS OF THE COUNCIL OF THE AMERICAN PHARMACEUTICAL ASSOCIATION, 1936–1937.

Office of the Secretary, 2215 Constitution Avenue, Washington, D. C.

LETTER NO. 12.

April 12, 1937.

To the Members of the Council:

89. Time and Headquarters 1937 Meeting. Motion No. 41 has been carried (Council Letter No. 10, page 357) and the week of August 16th as the time and the Pennsylvania Hotel as the headquarters, are approved.

90. Election of Members. Motion No. 42 (Council Letter No. 11, page 360) has been carried and applicants for membership, numbered 295 to 317, inclusive, are declared elected.

91. Use of Text of N. F. VI. The following communication has been received from Chairman DuMez of the Committee on Publications:

> "In response to your letter of the 1st it is stated that I recommend that permission be granted Lea & Febiger to use the text of the N. F. VI in a new edition of Bradley's Pharmaceutical Arithmetic and that the customary fee of $5.00 be charged for this grant.
>
> "Lea & Febiger have had permission to use the text of the National Formulary before and from the advance notices of the appearance of the book, I take it that its style will not be changed materially. There does not appear to be any danger of misuse of the text of the N. F."

(*Motion No. 43*) It is moved by DuMez that Lea and Febiger be granted permission to use the text of the N. F. VI in a new edition of Bradley's Pharmaceutical Arithmetic with the usual acknowledgment and the customary fee of $5.00.

92. Corrections in N. F. VI. See Council Letters, 1935–1936, Nos. 17, page 365; 21, page 473; and 22, page 556, and Council Letter, 1936–1937, No. 6, page 85. Chairman Gathercoal has forwarded page proofs, copy attached, of Corrections in N. F. VI (Second List) as approved by the Committee on N. F., and requests that the issuance of the corrections in this form be approved.

For the information of the Council, 15,000 copies of the First List of Corrections have been printed of which from 2500 to 2600 remain on hand, and it is probable that this number will be sufficient for future requirements. These corrections apply to the first printing of N. F. VI, of 25,000 copies, and they were made in the plates before the second printing, of approximately 10,000 copies, of which approximately 3300 copies are on hand.

The corrections in the second list apply to the first and second printings of N. F. VI, and they will also be made in the plates before the third printing is ordered.

It is planned to send the following bulletin to the pharmaceutical, medical, dental, veterinary, hospital and chemical publications, to secretaries of pharmaceutical associations and of state boards of pharmacy, to schools and colleges of pharmacy, and to member firms of the A. D. M. A., A. Ph. M. A., N. W. D. A., F. W. D. A. and the Proprietary Association:

"Since the issuance of the first list of 54 Corrections in National Formulary VI in June 1936, the Committee on N. F. has carefully studied other suggested corrections in the text and have compiled a second list of 36 corrections to be made in the first and second printings of the N. F. VI, bearing official coupons with serial numbers from 100,001 to 135,260. The corrections have been approved by the Council of the A. PH. A. to become official on July 1937, and corresponding corrections will be made in subsequent printings of N. F. VI.

"A list of these corrections, with an index, printed on one side of the sheet and in type corresponding to that replaced, is available, without cost, and is so arranged that the sheets can be inserted in the front of the N. F. VI or that each correction can be cut out and pasted over the wording it is to replace.

"Requests for Corrections in N. F. VI (Second List) may be sent to Mack Printing Company, Easton, Pa., or to the AMERICAN PHARMACEUTICAL ASSOCIATION, 2215 Constitution Ave., Washington, D. C., and must give address and be accompanied by sufficient postage to insure delivery. Corrections in N. F. VI (First List) may be obtained in the same way by owners of N. F. VI bearing numbers 100,001 to 125,000, who may not already have this list".

(*Motion No. 44*) It is moved by Kelly that the proposed corrections in the text of N. F. VI as given on the attached page proof entitled "Corrections in N. F. VI (Second List)", be approved, that corresponding corrections be made in the plates of N. F. VI before the third printing, and that a list of the approved corrections covering the first and second printings of N. F. VI be issued in the form above indicated and without charge.

93. Applicants for Membership. The following applications, properly endorsed and accompanied with the first year's dues, have been received:

No. 318, John E. Donaldson, 3509—17th St., N. E., Washington, D. C.; No. 319, Joseph W. Briles 1349 Kenyon St., N. W., Washington, D. C.; No. 320, James C. Walton, P. O. B. No. 772, Steubensville, Ohio; No. 321, John F. Garges, 3414 Quesada St., N. W., Washington, D. C.; No. 322, Katherine Graham, 160 N. Menard St., Chicago, Ill.; No. 323, Gerald L. Kiefer, 53 Main St., Tonawanda, N. Y.; No. 324, Edward M. Gerstenzang, 1560 E. 32nd St., Brooklyn, N. Y.; No. 325, Henry Taylor Dean, Jr., Bureau of Medicine and Surgery, Washington, D. C.; No. 326, Theodore C. Keller, P. O. Box 171, Jacksonville, Fla.

(*Motion No. 45*) Vote on applications for membership in the AMERICAN PHARMACEUTICAL ASSOCIATION.

94. Investment of Funds. Since the meeting of the Council in December (Council Letter No. 6, page 83), the Committee on Finance has given careful study to the securities owned by the ASSOCIATION and to the money it has on hand for investment, because of the changing securities market.

At a meeting of the Committee in Baltimore on Tuesday, December 15th, it was tentatively decided to sell all of the bonds held by the ASSOCIATION with the exception of the U. S. Treasury Bonds, 2-7/8%, and the City of Baltimore Bonds, 4%, and to invest the proceeds in U. S. Treasury Bonds, 2¼%, 1959/56, as the safest security available, the objects being to increase the capital account, to improve the security of the investments, and to maintain the income. A detailed study of each security showed that the first two objectives could not be obtained without a serious loss in income.

A study was made, therefore, to determine which securities should be recommended for sale and which retained with advantage. The following lists are the result and it will be noted that short term securities are recommended for sale because they have a market value above par.

GROUP 1—BONDS TO BE SOLD.

$1,000	State of Tennessee	4¼%	1938
2,000	State of Illinois	4 %	1939
1,000	State of Illinois	4 %	1942
2,000	State of Tennessee	4½%	1944
3,000	State of Illinois	4 %	1944
1,000	City of Newark	4½%	1944
17,400	U. S. Treasury	2¼%	1947
$27,400			

GROUP 2—BONDS TO BE RETAINED.

$14,000	State of Massachusetts	3 %	1941
4,000	City of Montclair	4½ %	1945
5,000	City of Dallas	4½ %	1947
1,000	City of Dallas	4½ %	1948
1,000	Federal Farm Mortgage	3 %	1949
2,000	State of North Carolina	4½ %	1949
3,000	City of Newark	4½ %	1952
5,000	State of North Carolina	4½ %	1954
1,000	City of Detroit	4 %	1956

40,000	City of Baltimore	4 %	1957
2,000	City of Newark	5 %	1957
3,000	City of Chattanooga	4½ %	1959
5,000	City of Chattanooga	4¾ %	1959
1,000	City of Paterson	4¼ %	1960
18,500	U. S. Treasury	2-7/8%	1960
5,000	City of Dallas	4½ %	1963
200	Chicago, Milwaukee & St. Paul R. R.	5 %	1975
$110,700			

It was also recommended to sell the City of Chattanooga Bonds later on because they do not represent as sound an investment as the other securities, and to retain the State of Massachusetts Bonds although they mature in 1941 because of their high rating.

At the time the above lists were prepared, it was recommended that the proceeds from the sale of the bonds in Group 1 be invested in U. S. Treasury Bonds, 2¾%, 1959/1956. If so, it was estimated that the loss in income would approximate $140.00 per year for 6½ years, the average maturity, or a total of about $900.00, and that the capital gain would be about $3000.00 or a net difference of about $2000.00. Since that time, there has been a decline in the market price of the bonds recommended for sale and a corresponding decrease in the U. S. Treasury Bonds, 2¾%, and the net result of the sale is about the same.

The U. S. Treasury Bonds, 2¾%, are now offered on about a 2.82% basis and it is predicted that they will sell on a 3% basis in the next two or three weeks.

The Committee therefore recommends that the bonds in Group 1 be sold and the proceeds together with about $40,000.00 to be invested, be invested in U. S. Treasury Bonds, 2¾%, on or about May 15th, unless there should be a marked change in the situation before that time.

(*Motion No. 46*) It is moved by Swain that the bonds in Group 1 above be sold and that the proceeds with the money now on hand for investment, be invested in U. S. Treasury Bonds, 2¾%, 1959/1956 on or before May 15, 1937, unless there should be a marked change in conditions when the Council will be advised.

By approval of the Chairman of the Council, a vote is called for at this time, but will be considered as tenative if there is objection or if any member wishes to submit comments.

E. F. KELLY, *Secretary*.

RECENT VISITORS AT THE AMERICAN INSTITUTE OF PHARMACY.

Marston Taylor Bogert, Columbia University, New York City.
Mr. and Mrs. Karl Albert Seidler, Thalheim, Saxony, Germany.
H. Hollandt, Guestrow, Mecklenburg, Germany.
H. Andreas, Wittenberg (Loewen Apotheke), Germany.
Dr. and Mrs. M. Quint, Berlin, Germany.
W. Weissebach, Hospital Pharmacist, Berlin, Germany.
George G. Biddle, Chicago, Ill.
Mrs. Joseph E. Harding, Shelburn, Indiana.
Mr. and Mrs. J. Harry Swain, Berlin, N. J.
Isabell A. Holden, 328 Harvard Ave., Claremont, Calif.
Dr. Carl E. Becker, Mariemont, Ohio.
Marion Edes Estes, Brookline, Mass.
Mr. and Mrs. John F. Brown, Scranton, Pa.
Wm. B. Baker, Peoria, Illinois.
A. F. Howard, U. S. Marine Corps, Washington, D. C. (Lieut. Col.).
Dr. W. H. Kraemer, Wilmington, Delaware.
Paul B. Clarke, Bethlehem, Pa. (Simon Rau & Co. drug store, established 1743).
Herman Thersing, Dayton, Ohio.
Paul A. Monroe, Seattle, Wash.
V. Gilman Fiske, Kennebunk, Maine.
Theaphile de Port, Wright Field, Dayton, O. (U. S. Army Air Corps.)
A. P. Stark, Denton, Texas.
Master Sergeant Osco Shearer, Medical Dept., Fort McPherson, Georgia.
Ladislaus Richter, Budapest, Hungary.
Hugo Milrath, Zagreb, Jugoslavia.

EDITORIAL NOTES

REQUEST FOR THE PRESENTATION OF PAPERS AND REPORTS.

BY SECTIONS, CONFERENCES, SEMINARS AND OTHER BODIES.

The Officers of the bodies designated are addressing the members of the AMERICAN PHARMACEUTICAL ASSOCIATION for papers and reports to be presented at the New York meeting. The time for the convention is fast approaching and the contributions should soon be in the hands of the officers so they may be included in the printed program.

A copy of the paper should be filed with the officers of the Section or body before which it is to be read and a copy addressed to the Editor of the JOURNAL, 2215 Constitution Ave., Washington, D. C. Please give this your early attention.

The officers are also requested to arrange the respective programs as soon as possible.

NOTICE OF THE SCIENTIFIC SECTION.

The 85th annual meeting will be held in New York City during the week of August 16th.

The officers of the Scientific Section appreciate the interest you have shown in the past years and are now making this appeal for your support to make the New York meeting a success. It is anticipated that a large number of papers will be submitted to the Section this year. The members, therefore, are requesting you to send in titles of papers at an early date.

Please note the following requirements:

1. The complete title and brief abstract, not to exceed 250 words must be in the hands of the secretary in time for enclosure in the published program not later than July 15th. Please advise the secretary whether you will present the paper in person, also whether a lantern will be required for presentation.

2. Ten minutes shall be allowed for the reading of the paper. If the paper is too lengthy to be read in detail in this space of time it shall be presented in abstract.

3. In writing the paper the author should follow the procedure as outlined in the enclosed notice to contributors.

4. The By-Laws provide that papers shall be presented in duplicate so that one copy will be available for publication and the other copy for the use of the Committee on Ebert Prize.

Our By-Laws also require that before publication all papers must be passed by the Board of Review of Papers. Authors can assist the Board of Review of Papers if, when writing the original paper, they eliminate all non-essential material, presenting the subject in short concise form.

F. E. BIBBINS, *Secretary*
5840 Washington Blvd.
Indianapolis, Indiana
GLENN L. JENKINS, *Chairman*.

THE SUB-SECTION ON PRACTICAL PHARMACY AND DISPENSING.

At the last meeting of the A. PH. A. a Sub-Section was established of the Section on Practical Pharmacy and Dispensing, of which Louis C. Zopf of Iowa City, Iowa, is the Chairman; his address is University Hospital. No doubt hospital pharmacists will desire to participate in the program of that Sub-Section and are invited to address the Chairman for further information.

DENMARK ANTI-VENEREAL PLAN.

Denmark, according to Dr. Thorvald Madsen, director of the State Serum Institute at Copenhagen, was the first country to adopt legislation designed to check the spread of venereal disease. Embodied in the Danish laws are two principles, he declared in a recent lecture at Johns Hopkins, the right and access to free treatment and the obligation to submit to the treatment. So Denmark makes a felony out of knowing transmission of syphilis or gonorrhea by one infected with either disease; an innocent victim may obtain compensation.

A TIMELY EFFORT.

The Pharmaceutical Institute of Minnesota is promoting a valuable work by giving pharmacists an opportunity to review their studies and acquainting them with new methods in pharmaceutical practice. About fifty pharmacists returned to the University for an intensive 3-day post-graduate course.

NEW p_H INDICATOR.

Discovery of a new p_H indicator was announced before the Virginia Academy of Sciences by Dr. John H. Joe, professor of chemistry at the University of Virginia.

Dr. James W. Beams, professor of physics, reported on another type of centrifuge and improvements that increase the speed of the ultracentrifuge.

NEW AND NONOFFICIAL REMEDIES.

THE FOLLOWING ADDITIONAL ARTICLES HAVE BEEN ACCEPTED AS CONFORMING TO THE RULES OF THE COUNCIL ON PHARMACY AND CHEMISTRY OF THE AMERICAN MEDICAL ASSOCIATION FOR ADMISSION TO NEW AND NONOFFICIAL REMEDIES. A COPY OF THE RULES ON WHICH THE COUNCIL BASES ITS ACTION WILL BE SENT ON APPLICATION.—PAUL NICHOLAS LEECH, *Secretary*.

PROTAMINE ZINC INSULIN (See *Journal A. M. A.*, Feb. 20, 1937, page 640).

Protamine Zinc Insulin.—Mulford.—A brand of protamine zinc insulin.

Manufactured by Sharp & Dohme, Inc., Philadelphia, under license from the governors of the University of Toronto.

Protamine Zinc Insulin.—Mulford, 10 cc.: Each cubic centimeter contains 40 units of insulin together with protamine and approximately 0.08 mg of zinc.

DIPHTHERIA TOXIN FOR THE SCHICK TEST (See New and Nonofficial Remedies, 1936, p. 409).

The Gilliland Laboratories, Inc., Marietta, Pa.

Diphtheria Schick Test Toxin, Diluted Ready for Administration-Gilliland.—Also marketed in packages containing sufficient material for 100 tests. As a means of control, the Schick Test Control representing diluted diphtheria toxin heated sufficiently to destroy the specific exotoxins is supplied in packages containing sufficient material for ten, twenty-five, fifty and 100 control tests.

DIPHTHERIA TOXOID, ALUM PRECIPITATED (REFINED) (See New and Nonofficial Remedies, 1936, p. 393).

The Gilliland Laboratories, Inc., Marietta, Pa.

Diphtheria Toxoid, Alum Precipitated (Refined).—Also marketed in packages of one 0.5 cc. vial (one immunization); ten 0.5 cc. vials (ten immunizations); one 5 cc. vial (ten immunizations).

CALCIUM GLUCONATE (See New and Nonofficial Remedies, 1936, p. 146).

Calcium Gluconate-Abbott.—A brand of calcium gluconate-U. S. P.

Manufactured by the Abbott Laboratories, North Chicago, Illinois. No U. S. patent or trademark.

Sterile Ampoule Calcium Gluconate, 10%-Abbott: Each ampule contains 10 cc. of a 10 per cent stabilized supersaturated solution of calcium gluconate-Abbott.

SODIUM AMYTAL (See New and Nonofficial Remedies, 1936, p. 114).

The following dosage form has been accepted:

Suppositories Sodium Amytal, 3 grains.—Journal A. M. A., March 20, 1937.

A. M. A. MEETING.

The eighty-eighth annual session of the American Medical Association will be held in Atlantic City, New Jersey, June 7 to 11, inclusive, 1937.

A Symposium on Health Problems in Education, under the sponsorship of the Joint Committee on Health Problems in Education of the National Education Association and the American Medical Association, together with the A. M. A. Section on Pediatrics and Section on Preventive and Industrial Medicine and Public Health, will be held in the Music Room of the Hotel Chalfonte, Atlantic City, June 8th, at 2 P.M. Dr. Thomas D. Wood, chairman of the Joint Committee, will preside.

INTRA-AMERICAN CONFERENCE ON EDUCATION.

The Intra-American Conference on Education will be held in Mexico, August 1937, and the AMERICAN PHARMACEUTICAL ASSOCIATION has been invited to participate. The Honorary President is Secretary Gonzalo Vazquez Vela, for Public Education.

The Secretary General, Professor Enrique Beltran, has submitted the invitation to the ASSOCIATION.

LIMITATION OF THE NUMBER OF PHARMACISTS.

Secretary General T. Potjewijd is addressing the affiliated bodies of the International Pharmaceutical Federation and other members. The communication states that the limitation of the number of pharmacists is the subject of detailed studies being made in various countries, such as Italy, Switzerland, etc. It is further stated:

"However, the limitation of the number of pharmacies is a difficult question not to be too quickly decided, because this problem has, at the same time, legal, social and economic aspects. Furthermore, the Bureau of the International Pharmaceutical Federation does not know whether it should take any position upon the question.

"If, however, the active members wish us to do so, the Bureau is naturally ready to take the matter up and we, accordingly, ask you kindly to inform us:

"(1) Whether such limitation is already effective in your country.

"(2) What means are being used to bring about such limitation.

"(3) And, in case such limitation has not yet been effected, whether it constitutes in your country a matter of such national interest that your association would like to have an examination of the subject made.

"We ask you to note that a most effective limitation has already been put into effect in the following countries: Germany, Austria, Denmark, Finland, Iceland, Hungary, Norway, Sweden and Czechoslovakia."

SOUVENIR OF THE CORONATION BANQUET AT GUILDHALL.

The Pharmaceutical Society of Great Britain prepared a beautiful Souvenir Program for the Coronation Banquet held at Guildhall, April 6, 1937. The cover is a reproduction of the Title Page of the London Pharmacopœia of 1627.—The Royal Arms and the Arms of the City are incorporated, together with representations of Galen and Avicenna, who are the supporters of the Arms of the Pharmaceutical Society of Great Britain.

The site of Guildhall has been used by civic government for more than a thousand years.

The ceremonial of the British pharmacists for the Coronation Banquet contains Grace, the Menu, Toasts and program of music. Another part gives the list of guests and plan of tables.

THE EDGAR FAHS SMITH COLLECTION.

An endowment fund of $50,000 for the maintenance and future development of the collection of chemical memorabilia assembled by the late Dr. Edgar Fahs Smith, formerly professor of chemistry and provost of the University of Pennsylvania, has been established by Mrs. Smith. It was through her generosity that the collection was presented to the University following the death in 1928 of her husband. Dr. Smith, on many occasions, evidenced his valuation of pharmacy.

PERSONAL AND NEWS ITEMS.

Frank B. Kirby is on a 3-months' vacation in Europe.

Professor Emil Perrot, of the University of Paris, Paris, France, has been invited to represent the AMERICAN PHARMACEUTICAL ASSOCIATION as delegate for the Seventeenth Congress of Industrial Chemistry. Dr. Perrot is an *Honorary Member* of the AMERICAN PHARMACEUTICAL ASSOCIATION. The Congress will convene in Paris, September 26th to October 22nd.

Announcement has been made by Secretary Hugo H. Shaefer that **J. Leon Lascoff** has been awarded the Remington Honor Medal. Sketch of Dr. Lascoff is deferred to the time of the formal award.

The world-famous Lloyd Library was transferred to the University of Cincinnati, April 7th. thereby its great value to pharmacy and science will be preserved.

Dr. James F. Norris, professor of organic chemistry, and director of the research laboratory in organic chemistry at the Massachusetts Institute of Technology, has won the medal of the American Institute of Chemists, awarded annually for "outstanding service to the science of chemistry or to the profession of chemist in America." Dr. Maximilian Toch, president of the institute, in making the announcement, said the award was in recognition of Dr. Norris' outstanding service as a teacher and an investigator in the field of organic chemistry.

Thirty-one members of the Chicago Veteran Druggists' Association and one visitor—George Epstein, district manager for the Abbott Laboratories—at their April 22nd noon luncheon at the Bismarck Hotel celebrated the 73rd birthday of **Frater Charles A. Storer,** veteran treasurer of C. R. D. A. and one of its best beloved stalwarts.

E. L. Newcomb discussed several crude drugs before the recent meeting of the American Drug Manufacturers' Association. He spoke of the possibility and desirability of reducing the official alkaloidal requirement for stramonium from 0.30 per cent to the 0.25 per cent of the U. S. P. X standard. In this connection Charles C. Neal referred to the high percentage of rejected importations of stramonium reported from time to time.

Dr. Newcomb criticized the official limitation of capsicum to the African article, saying that capsicum grown in Louisiana was of equal quality in pungency, and that flavor was an important characteristic. He mentioned the work being done to develop a chemical test for capsicum. The official exclusion of the rhapontic variety of rhubarb was questioned by him because of the difficulty of distinguishing it.—Through *Oil, Paint and Drug Reporter.*

Prof. L. K. Darbaker, University of Pittsburgh, School of Pharmacy, was honored by Ohio Northern University, on May 30th, with the degree of Doctor of Science.

OBITUARY.

CHARLES HAMILTON AVERY.

Charles H. Avery, for more than thirty years a member of the AMERICAN PHARMACEUTICAL ASSOCIATION, died at Altadena, California, May 9th, in his 86th year. He was born in New London, Connecticut, December 24, 1851. During his early years the family moved from Connecticut to Illinois, where he became engaged in retail pharmacy in Belvidere in 1870. Later, he opened a pharmacy in Madison and was one of the founders of the Wisconsin

CHARLES H. AVERY.

Pharmaceutical Association, in 1883. Later, returning from Wisconsin to Illinois, he became one of the leaders in retail pharmacy at Chicago, being president of the Chicago Retail Druggists' Association for a number of years. He was a member of the Illinois Board of Pharmacy commencing with 1907.

In 1906 Mr. Avery became one of the founders of the American Druggists' Fire Insurance Company and at the organization of that Company in January of 1907 he became its first president. He continued as its president during the thirty years since his election. In 1927, he moved with his family, to Altadena, California. He was an honorary member of the Veteran Apothecaries Association of Cincinnati. Three daughters, Mrs. Louise Avery Burtt, Mrs. Winifred Avery Blakeslee and Miss Leona May Avery, together with a number of grandchildren, survive him. The funeral services were held at Altadena, California, May 15th, and were attended by a number of officials of the Company from Cincinnati and other parts of the country.—F. H. F.

FRANK A. BLAIR.

Frank Anthony Blair, well known for his activities in legislative matters, especially in proprietary legislation, died May 5th, at Doctors' Hospital, New York City, following a brief illness, aged 67 years. He was born in Franklin Centre, Quebec, Canada, of Scotch ancestry. He entered the proprietary medicine industry as a salesman and soon gave thought to improving conditions, both as to manufacture and advertising.

Twenty-two years ago he became president of the Proprietary Association. A testimonial dinner was tendered him at the Hotel Waldorf-Astoria in 1934, marking his 20th year as president of the Association. It was attended by nearly one thousand friends. He is survived by his widow and a son, F. King Blair, of Chicago.

Elias Potter Lyon, professor of physiology at the University of Minnesota, who resigned last year as dean of the Medical School, died suddenly on May 4th. He was in his seventieth year.

SOCIETIES AND COLLEGES.

JUNE STATE ASSOCIATION MEETINGS.

Alabama—June 16–18, Montgomery.
Arizona—June 14–17, El Paso, Texas.
Arkansas—June 8–10, Hot Springs.
California—June 20–23, Pasadena.
Colorado—June 15–17, Colorado Springs.
Connecticut—June 29–30, New London.
Delaware—June 28–29, Rehoboth Beach.
Idaho—June 6–8, Boise.
Indiana—June 15–17, Lake Wawasee.
Kentucky—June 22–25, Louisville.
Maine—June 21–23, Kineo.
Maryland—June 22–25, Ocean City.
Massachusetts—June 1–2, Swampscott.
Michigan—June, first week, Kalamazoo.
Mississippi—June 15–16, Biloxi.
New Jersey—June 23–25, Atlantic City.
New Mexico—June 14–17, El Paso, Texas.
New York—June 15–18, Bolton Landing.
North Dakota—June 15–17, Grand Forks.
Pennsylvania—June 14–17, Harrisburg.
Rhode Island—June, Watch Hill.
South Carolina—June 8–10, Charleston.
South Dakota—June, Watertown.
Texas—June 14–17, El Paso, Texas.
Utah—June, Salt Lake City.
Virginia—June 21–23, Old Point Comfort.

Washington—June 27–29, Wenatchee.
West Virginia—June 14–15, Clarksburg.
Wisconsin—June 22–24, Manitowoc.

STATE MEETINGS.

Montana will meet this year at Butte, on the same days as Oregon, July 12th–14th.

Arizona will not hold its convention until October 27th–29th.

In Nevada there seems to be some question as to whether a meeting will be held this year according to Lester J. Hilp of Reno, association secretary.

GOLDEN ANNIVERSARY OF FLORIDA STATE PHARMACEUTICAL ASSOCIATION.

Florida State Pharmaceutical Association held its Golden Anniversary, May 18th–20th, at St. Petersburg, Florida. Greetings were brought from the various national pharmaceutical associations, also from the Florida Medical Association, Florida Dental association and Florida Nurses Association. President George O. Taylor presided at the sessions. E. L. Newcomb, Executive Vice-President and Secretary of the N. W. D. A., delivered an address.

The report of the Committee on Pharmacy in the U. S. Army was submitted by Dr. B. V. Christensen and that on New Remedies by Chairman E. J. Ireland. Dr. W. J. Husa presented an address on, "Some of the Important New Preparations of the U. S. P. and N. F."

The May issue of the *Southeastern Drug Journal* was published in two parts; one, a section on "The Golden Anniversary and the History of the Florida Pharmaceutical Association."

The Establishment and Progress of the School of Pharmacy was a most interesting report of the Golden Anniversary number.

KANSAS OFFICERS FOR 1937.

President, Klon Randle, Wichita; *First Vice-President*, C. J. Arbuthnot, Lebanon; *Second Vice-President*, W. S. Daugherty, Syracuse; *Treasurer*, Blane Miller, Salina; *Librarian*, L. D. Havenhill, Lawrence.

MISSOURI OFFICERS.

President, Maurice D. Brummall, Salisbury; *First Vice-President*, Keith Karnes, North Kansas City; *Second Vice-President*, Ted Willard, Camdenton; *Third Vice-President*, Emmanuel Greengard, St. Louis; *Honorary President*, T. B. Montgomery, Warrensburg; *Secretary*, Kenneth Nichols, Jefferson City; *Treasurer*, Murray Q. Williams, Warrensburg.

OFFICERS OF AMERICAN DRUG MANUFACTURERS' ASSOCIATION.

President, John F. Anderson, New Brunswick, N. J.; *First Vice-President*, Oscar W. Smith, Detroit, Mich.; *Second Vice-President*, S. De Witt Clough, North Chicago, Ill.; *Third Vice-President*, Frederick S. Stearns, Detroit, Mich.; *Treasurer*, Robert Lincoln McNeil, Philadelphia, Pa.

Additional members of the Executive Committee, George W. Merck, Rahway, N. J.; John G. Searle, Chicago; L. N. Upjohn, Kalamazoo, Mich.; John S. Zinsser, Philadelphia; A. C. Boylston, St. Louis, Mo.

Executive Vice-President and *Secretary*, Carson P. Frailey, Albee Building, Washington; *General Counsel*, Horace W. Bigelow, Detroit.

The annual session was held at Hot Springs, Va., May 3rd to 6th. The AMERICAN PHARMACEUTICAL ASSOCIATION was represented by Secretary E. F. Kelly.

ORGANIZATION OF LOUISVILLE VETERANS' DRUG CLUB.

At a dinner on April 14, 1937, at the Kentucky Hotel, John J. Seiberz was host to the directors and dean of the Louisville College of Pharmacy, and the Veterans' Drug Club of Louisville was organized with an initial membership of thirteen. Those present were: Clarence B. Davis, Wm. H. Fischer, George H. Gould, Edward H. Hinkebein, Fred P. Kranz, Sr., Arthur P. Markendorf, Edward H. Meyer, Rudolph V. Miersch, Fred Otterbach, Arthur T. Schreiber, John J. Seiberz, W. Oscar Votteler and Gordon L. Curry.

Officers elected were Gordon L. Curry, *President;* Fred P. Kranz, Sr., *Vice-President;* John J. Seiberz, *Secretary* and *Treasurer*. The membership is to be limited to twenty-five and the official home is to be the Kentucky Hotel. Meetings are to be held on third Thursday of each month.

UNIVERSITY OF WASHINGTON.

Pharmacy will occupy a portion of the main floor and all of the third floor of the new Pharmacy-Chemistry Building. According to Dean C. W. Johnson, pharmacy will "move in" at the opening of school next fall.

LEGAL AND LEGISLATIVE.

THE PRESIDENT DELAYS TYDINGS BILL.

The President gave as a reason for his action on the Tydings Bill—the rising of retail prices and that insufficient study had been given the subject. At this writing there has been no concerted effort to bring the measure into action; when the announcement was made general surprise was expressed, expecially because the word came from President Roosevelt on the day that the Miller Bill was to have been taken up in the House. Careful study relative to action is being given by those who are best informed.

See "Fair Trade" by R. L. Swain in this issue of the JOURNAL.

FAIR TRADE.

With the addition of five more states which have passed Fair Trade Acts the number is brought to a total of thirty-nine states; they are: Arizona, Arkansas, California, Colorado, Delaware, Georgia, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Michigan, Minnesota, Montana, Nebraska, Nevada, New Jersey, New Mexico, New York, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Utah, Virginia, Washington, West Virginia, Wisconsin and Wyoming.

In view of the unexpected developments relative to the Tydings-Miller National Fair Trade Enabling Act, the meeting of representatives scheduled to be held in Chicago, May 31st, has been postponed.

CUT ON BUDGET.

A cut of $100,000 from the budget estimate for the Food and Drug Administration was made by the House of Representatives on the recommendation of its Appropriations Committee. In spite of the cut, the appropriation as passed by the House is $100,000 greater than for the present fiscal year, the budget having recommended an increase of $200,000.

In passing the curtailed allotment for the Food and Drug Administration, the House over-rode an amendment by Congressman Kenney of New Jersey, member of the Food and Drug Sub-committee. In arguing for his amendment, Kenney the Congressman, said that a new food and drug bill, which will increase the duties of the Administration, is on the way. He pointed out that the bill will give the agency control over cosmetics in addition to its other duties.

CANNABIS CONTROL BILL.

The Marihuana (cannabis) taxing bill was reported out by the House Committee on Ways and Means, May 11th, after having been amended to meet objections from affected industries. The bill has been reintroduced by Chairman Robert N. Doughton as H. R. 6906. The definition of "Marihuana" for tax and regulatory purposes has been changed to exclude hempseed oil and cake and sterilized hempseed incapable of germination—changes made at the request of paint manufacturers, oilseed crushers and birdseed dealers. The requirement that quantities of seed handled be reported periodically has been lightened by permitting the Secretary of the Treasury to prescribe regulations for making such reports; whereas, the original bill would have required reports on exact quantities of all non-exempt products of the cannabis or hemp plant. The scale of taxes has been reduced.

DEATH OF THE VICE-PRESIDENT OF BRITISH PHARMACEUTICAL SOCIETY.

Dr. Edward Harry Simmons, vice-president of the British Pharmaceutical Society, died May 1st at Manchester. The *Pharmaceutical Journal* closed a tribute with the following words: He gave his services to his fellows unstintingly and untiringly. He sought no rewards but such as came to him in the natural course of his service and were richly merited. Had he lived to take his place in the presidential chair he would have acquitted himself in that honorable position in a manner which would have added lustre to the office.

THE CORONATION.

The Coronation has brought out much of historical interest. The Ampulla and Anointing Spoon are more than a thousand years old. The composition of this sacred oil is based on a formula which dates back to the seventeenth century. It is prepared from oil of orange flowers, oil of roses, oil of cinnamon, musk, civet, ambergris, oils of jasmin and sesame, and flowers of benzoin. It is prepared according to the art of the Apothecary.

BOOK NOTICES AND REVIEWS.

The second edition of *Quantitative Pharmaceutical Chemistry* by Jenkins and DuMez is a decided improvement on a very useful and generally used book.

Many determinations have been dropped and others added. The chapter on ultimate analysis has been completely eliminated and this space used to much better advantage in presenting other material.

An examination of the book will reveal that all determinations are presented in the same clear concise and greatly detailed manner, as was so characteristic of their earlier edition. In fact it might be suggested that in some instances the desire for clarity, which has been so splendidly obtained, may have led the authors into too much detail. It is also possible that some of the determinations presented might have been omitted without any considerable weakening of the volume.

The theoretical aspect of the book has been improved and brought up-to-date. In the opinion of the reviewer the theoretical side of the presentation might be further advantageously increased.

The revised volume is a real contribution to the field of pharmaceutical analytical texts. A favorable and enthusiastic reception is assured. It will be read and profitably used by a wide circle of workers, quite outside of the pharmaceutical group.—ERNEST LITTLE.

Principles of Pharmacy (Fourth Edition). By HENRY V. ARNY, Ph.M., Ph.D., Dean and Professor of Chemistry in the College of Pharmacy of Columbia University; sometime Dean and Professor of Pharmacy in the School of Pharmacy of Western Reserve University; Member of the Committee of Revision of the United States Pharmacopœia, Eleventh Revision; Member of the Committee of Revision of the National Formulary, Sixth Edition.

With the Collaboration of Robert P. Fischelis, B.Sc., Ph.M., Phar.D., Secretary and Chief Chemist, Board of Pharmacy, State of New Jersey; sometime Dean and Professor of Pharmacy, New Jersey College of Pharmacy; Special Lecturer, Philadelphia College of Pharmacy and Science. Published by W. B. Saunders Co., Philadelphia, 1937. 1139 pages with 294 illustrations. Cloth, $8.00.

The present edition of *Principles of Pharmacy* again largely represents the labor of Dr. Arny whose clear and informal style of presentation of the subject matter is retained throughout the book.

This edition has been thoroughly revised to conform to the new editions of the United States Pharmacopœia (U. S. P. XI) and the National Formulary (N. F. VI). The book contains fifty-nine chapters, covering six major divisions, namely: Pharmaceutic Operations and Appliances, Galenic Pharmaceutic Preparations, Inorganic Chemistry, Organic Chemistry, Pharmaceutic Testing and The Dispensing of Prescriptions. The most recent advancements in medication, notably synthetic chemicals and endocrine preparations, are given particular attention.

The book contains a very complete index covering fifty-five pages, together with a list of abbreviations and an excellent list of reference books. One of the outstanding features of the book is its very complete bibliography of one hundred pages on the subject matter of the various chapters. This bibliography, found at the end of each chapter, gives the student and research worker direct reference to all of the literature on the various theories, products and processes covered in the text. In addition, reference is made to the more recent theories in chemistry on the subjects of atomic structure, quantum theory, the phase rule, colloids, etc., and bibliography cited. The book is replete with many illustrations of modern apparatus and appliances used in present-day manufacturing and dispensing pharmacy.

Recognized as a standard text since the publication of the first edition twenty-seven years ago, this book affords the student concise information concerning the standards of the Pharmacopœia and the National Formulary. While the book does not include complete U. S. P. and N. F. texts, it serves both as a commentary and explanatory text intended to lead the student step by step to an understanding of the fundamental factors which underlie pharmaceutical training.

Dr. Fischelis has included an interesting chapter on the review of the development of pharmacy with emphasis on its contemporary phases, and has brought up-to-date the chapter relating to bacteriology and its pharmaceutical applications.

Aside from its value as a student text, this book should be a part of the library and equipment of every practicing pharmacist.—HORACE M. CARTER.

INTERNATIONAL PHARMACEUTICAL FEDERATION.

Secretary T. Potjewijd, of the International Pharmaceutical Federation, tentatively announces the meeting of this organization, in Copenhagen. Members of pharmaceutical faculties and members of National associations holding membership in the Federation are invited; those who will attend should advise the Secretary at 37 Boerhaavelaan Leyden, Holland, if possible, in June, and receive credentials. Special transportation rates will be given.

Dr. J. Hofman (Honorary Member of the A. PH. A.) will be honored. Extensive entertainments are being arranged and excursions to interesting points of this section, visits to museums and, if a sufficient number desire, a trip to Jutland will be arranged with a visit to the shores of the North Sea.

INTERAMERICAN CONFERENCE ON EDUCATION.

In accordance with the recommendation of the Second Interamerican Conference on Education the Government of the Republic has sponsored the Third Conference, which is to meet in the City of Mexico next August.

The AMERICAN PHARMACEUTICAL ASSOCIATION has received a cordial invitation to be represented by delegates. The *Secretary General* is Prof. Enrique Beltran; the *Honorary President* is Atty. Gonzalo Vazquez Vela and the *President*, Atty. Manuel R. Pelacios. The officers may be addressed at the Department of Public Education, D. F., Mexico. The relations with our neighbor Republic are most cordial; visitors will be welcome and well repaid by a visit in a country that has many scenic and historic attractions. The ASSOCIATION counts several members among the neighbors; last year, preceding and following the Dallas meeting, a number visited in Mexico.

GERMANY'S NEW PHARMACY REGULATIONS.

Several Articles or parts of them from the Regulations which become effective July 1st, are quoted:

From Article 1.—"The Pharmacist is called to the service of the health of the people; more particularly is it his duty to supply the people with their medicinal needs. In this he fulfils a public duty."

From Article 2.—"The profession of pharmacist can be exercised in the German Reich only by such persons as are designated Pharmacists by the proper German authorities."

From Article 3.—"The Reich Minister of the Interior can give to a Pharmacist who is duly designated in a foreign country the right, of a revocable character, to practice the profession of pharmacy in the German Reich."

From Article 4.—"The pharmacist is obligated to practice his profession conscientiously and to show himself, by his conduct in the practice of his profession and in his private life, worthy of the respect and confidence for which his profession calls."

From Article 7.—"The Administrator of the Reich Chamber of Pharmacy will be a prominent German pharmacist, chosen by the Reich Minister of the Interior with the approval of a representative of the leading pharmacists. He will represent the Reich Chamber of Pharmacy legally and extra-legally."

Punishments.—"The punishments for unethical procedure are:

1. Warning.
2. Reprimand.
3. Fine, up to 5000 Reichsmarks.
4. Announcement that the guilty party is unworthy (temporarily or permanently) to practice the pharmaceutical profession."

"Whoever, without having been designated a Pharmacist, makes any printed announcement which could lead to the opinion that he is a Pharmacist."

"Any pharmaceutical official who without authorization discloses any secret which has come to him, either by reason of his position or casually, will be punished by imprisonment up to one year and fine or by either of these punishments."

"As professional courts for pharmacists there will be established a District Court for each District Chamber, and a Supreme Court of Pharmacy for national jurisdiction."

GEORGE A. MOULTON.